

THE EFFECTS OF THE MEDICARE METHOD OF
REIMBURSEMENT ON PHYSICIANS' FEES
AND ON BENEFICIARIES' UTILIZATION

VOLUME II, PART I
EFFECTS ON PHYSICIANS' FEES

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WASHINGTON, D.C.

APRIL 1973

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Volume II, Part I
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Submitted to the

Bureau of Health Insurance
Social Security Administration
Department of Health, Education and Welfare
Baltimore, Maryland

Contract Number SSA 72-2763

by

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Washington, D.C.

April 1973

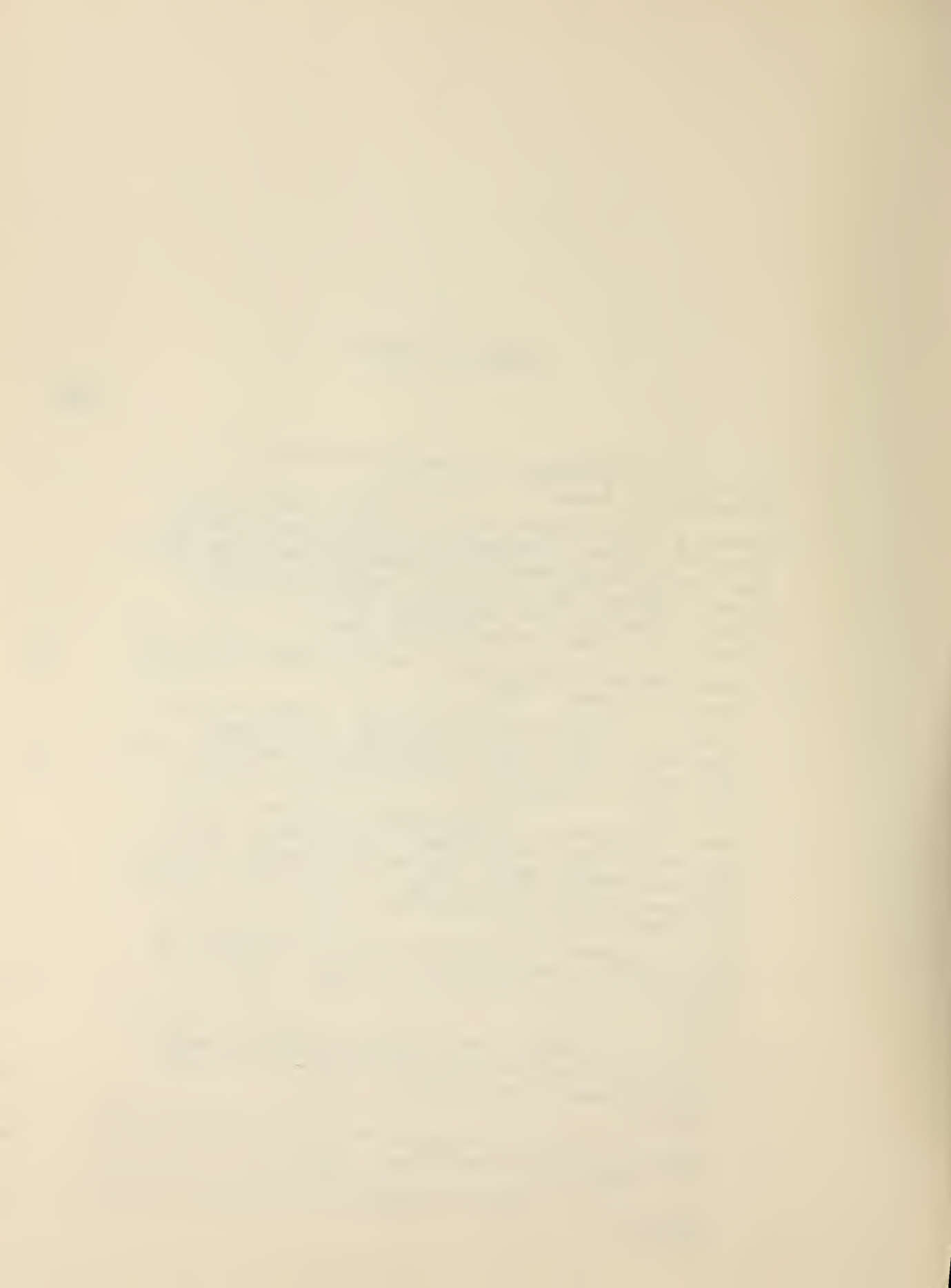
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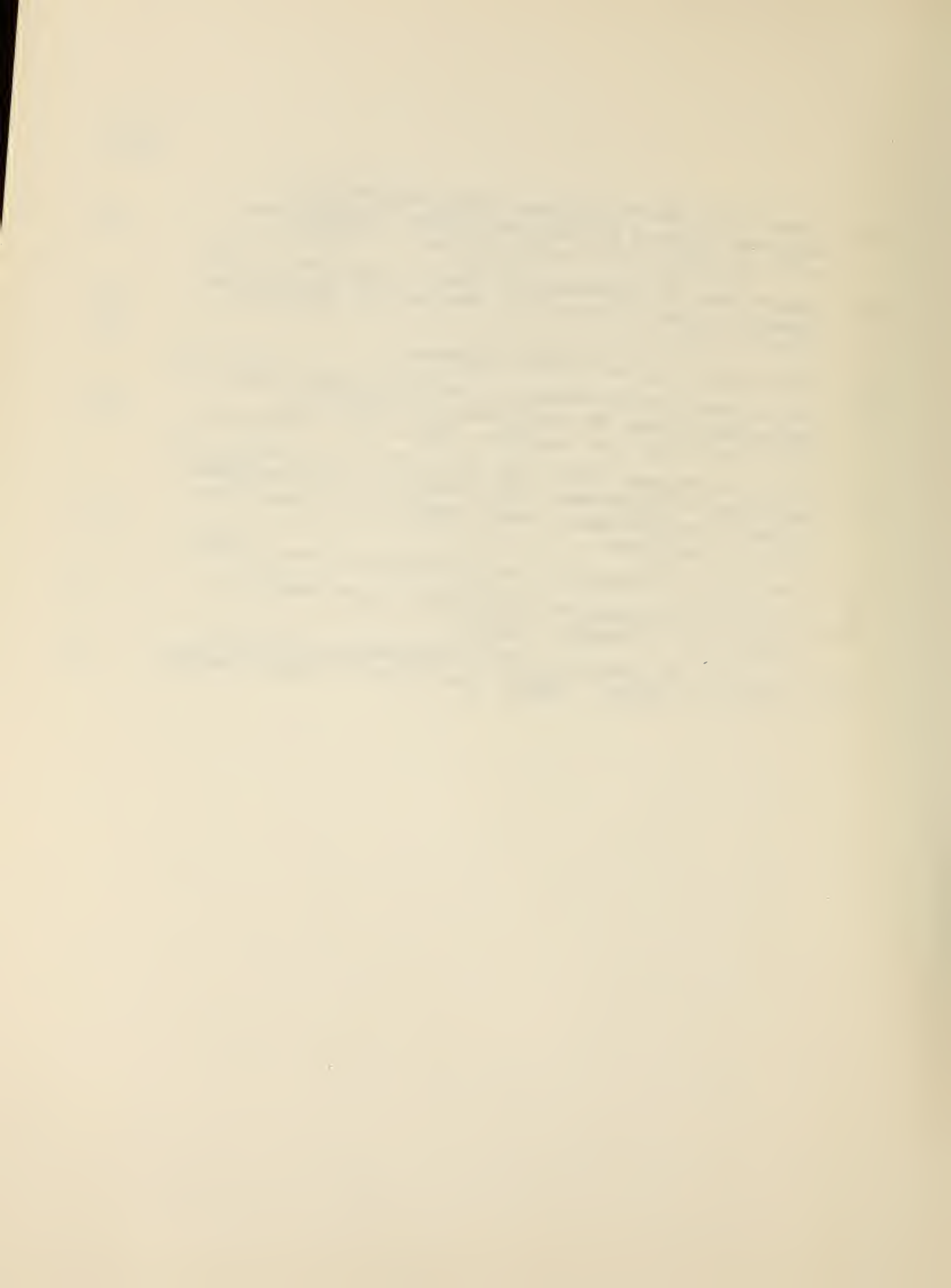


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FOREWORD

This study originated in a congressional mandate, Sec. 224(b) of "HR 1" (P.L. 92-603), to the Health Insurance Benefits Advisory Council (HIBAC) to investigate and report to the Congress on the effects of the Medicare (Part B) methods of reimbursement on physicians' fees generally and on costs borne by beneficiaries. (Other inquiries required by Sec. 224(b), particularly concerning the assignment rate, are the subject of studies other than this.) Robert R. Nathan Associates, Inc., was selected for this study on the basis of competitive proposals, and a contract was concluded on October 13, 1971.

The work to be performed under this contract came to focus on two distinguishable subjects: one dealing with physicians' fees and the other with patients' utilization rates. These are the respective subjects of Parts I and II of this volume. In both cases the difficulties of isolating the effects of the methods of Medicare Part B required powerful and discriminating methods of analysis, for which econometric techniques were uniquely suited.

In view of the difficulty and complexity of the study, RRNA convened a technical advisory panel of experts who met from time to time to offer critiques and suggestions. Professors Frank Sloan and Irving Goffman of the University of Florida, Professor Enrique Arzac of Columbia University, Professor Richard Rosett of the University of Rochester, Mrs. Agnes Brewster, and Stephen J. Harris served in this capacity. HIBAC also designated a committee under the chairmanship first of Professor Charles L. Schultze of the University of Maryland, and then of Jay Reibel, M.D., to oversee the study and to review progress at intervals.

We are greatly indebted to officials of the Social Security Administration, particularly to Raymond Johnson, the

project monitor; Howard West, Aaron Krute, Eugene Stickler, Nathaniel Pigman, Dorothy Rice, and Newton Dikoff of the Office of Research and Statistics; and Irwin Wolkstein and Robert Krouse of the Bureau of Health Insurance. P. Buonsignore supervised the preparation of the special tape files, and M. Moorhead carried out all programming for the testing and estimating for Part II of this volume.

This study, like any piece of institutional research, is the collaborative effort of many people. The principal investigators were Dr. Orest Koropecy and Dr. Lien-fu Huang, who together designed and executed the entire study. Insofar as they divided the work, Dr. Koropecy assumed primary responsibility for the design and continuity of the analysis of the various aspects of utilization (Volume II, Part II); Dr. Huang, of the aspects of physicians' fees (Volume II, Part I). Dr. Koropecy, as a full-time permanent staff member of RRNA, served in addition as Project Manager, with overall administrative as well as technical responsibility.

Other RRNA staff members who contributed significantly were Dr. E.W. Shomo, in the design stage; L. Bertman, in the preliminary work on price analysis; and M.C. Yang, N. Chow, J. Wu, and D. Harper in the statistical work.

We wish to acknowledge with thanks the cooperation of Dr. Edward Mills of the National Association of Blue Shield Plans, and the Blue Shield Plans of Michigan, Kansas, and Maryland for providing data.

We hope this study will be useful not only to HIBAC and the Social Security Administration but to all those who are wrestling with the important and difficult technical and policy issues in respect of health insurance.

Edward D. Hollander
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I. DEFINITION OF THE MEDICARE METHOD OF REIMBURSEMENT

Two Major Research Questions

Our report attempts to investigate two major questions raised by the implementation of Medicare Supplemental Medical Insurance (SMI), or Medicare Part B. More specifically, the focus is on the method of reimbursement of Part B. (Later, we will be distinguishing between the effects of Medicare as medical insurance and the effects arising from the Medicare method of reimbursement.)

The two principal fields of investigation are:

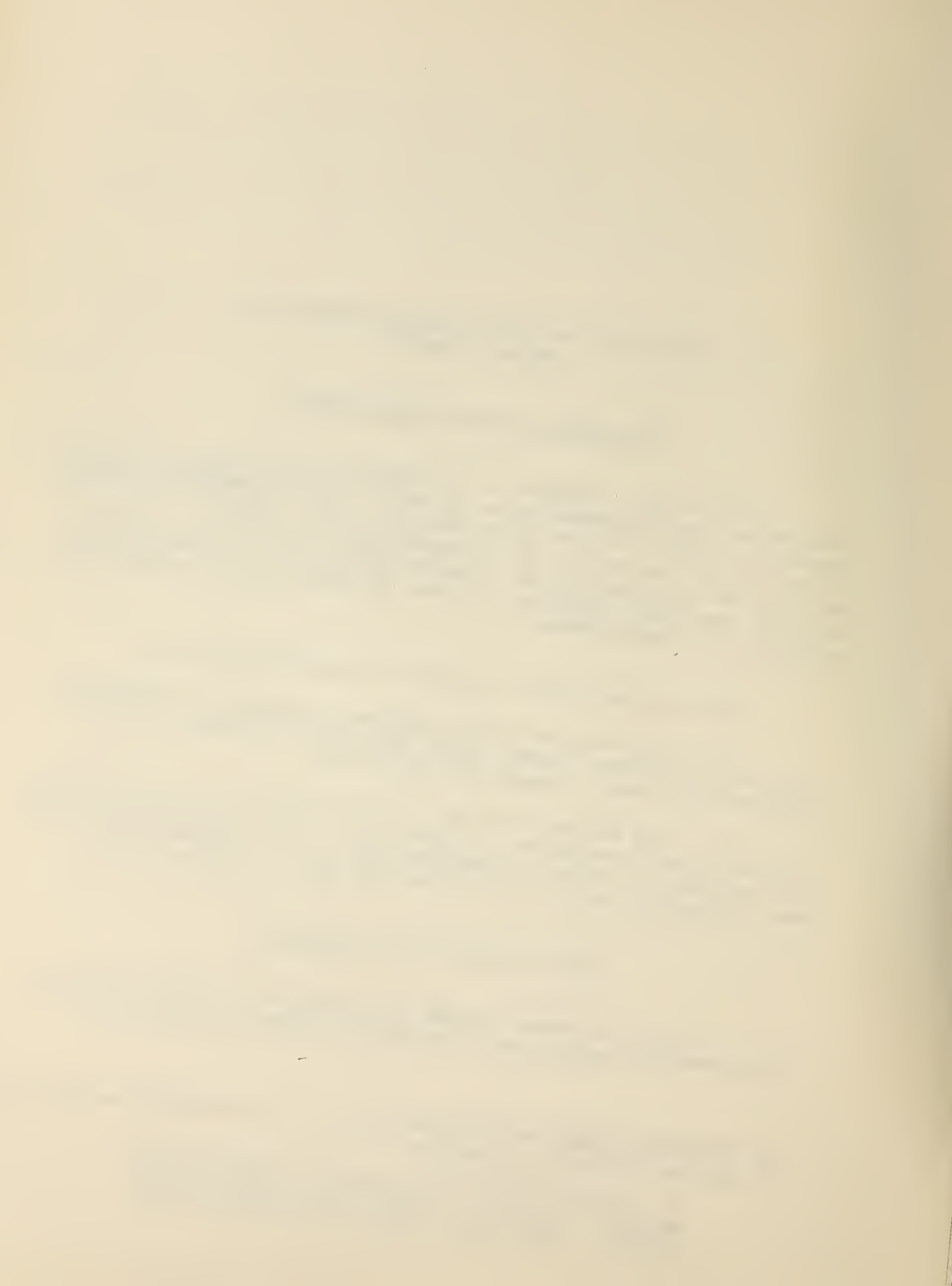
1. The effects of the Medicare method of reimbursement on physicians' fees, both the general level and the structure of fees charged by physicians.
2. The effects on the beneficiaries, on utilization of physicians' services, on the costs borne by beneficiaries, and on beneficiaries' understanding of the program as an element affecting both utilization and out-of-pocket cost.

The Elements of the Method

In the broadest sense, the "Medicare method of reimbursement"^{1/} comprehends the entire range of statutory,

^{1/} Excerpts from the "method" as it is presented to the enrollee in concrete instances:

If you and your doctor agree, Medicare will pay him directly. This is the assignment method. You do not submit any claim, the



administrative, and financial conditions for reimbursing beneficiaries for charges incurred in the use of physicians' services, and the arrangements among physicians, beneficiaries, financial intermediaries, and the Government for satisfying the conditions. Among the principal elements of the method are:

1. The statutory entitlement of enrollees, in consideration of a monthly premium, to reimbursement of 80 percent of "reasonable" charges for covered services, after the first \$50 in any year.^{1/} (The deductible recently has been raised to \$60; during the period studied it was \$50.)

2. The statutory and administrative standards of "reasonable charge," defined in terms of the "customary" fee of the individual physician for a specified service and the "prevailing" charge in the community.

3. The functions of Medicare Part B carriers (typically commercial or nonprofit health insurance carriers) in determining "reasonable" charges and reimbursing the beneficiary (or under certain conditions, the physician).

doctor does. All you do is fill out Part 1 of this form [SSA-1490] and leave it with your doctor. Under this method the doctor agrees to accept the charge determination of the Medicare carrier as the full charge; you are responsible for the deductible and coinsurance. Medicare can also pay you directly - before or after you have paid your doctor. If you submit the claim yourself, fill out Part 1 and ask your doctor to fill out Part II. Acceptance of an assignment requires the physician (or supplier) to accept the charge determination of the Medicare carrier as his full charge for the service. (Department of Health, Education, and Welfare, Social Security Administration, "Request for Medicare Payment," Form SSA-1490 (10-69), U.S. Government Printing Office, 1971.)

^{1/} Insofar as the deductible and the coinsurance rate apply only to covered services and reasonable charges, they are properly elements of the method of reimbursement. Beneficiaries cannot meet the deductible by using noncovered services; and they cannot be reimbursed for any part of charges found to be in excess of what is allowed as "reasonable." But insofar as the deductible and coinsurance are instruments

4. The reimbursement of these carriers by the Social Security Administration, and the regulations governing the determination of the "reasonable" charge to be "allowed" (i.e., approved for reimbursement).

5. Certain aspects of the financial transaction between the physician and the beneficiary whereby the physician may either (a) accept the allowed charge as full payment and "assign" his bill to the carrier for direct reimbursement of 80 percent of the "allowed" charge, or (b) bill the beneficiary for any agreed charge, in which case the beneficiary is responsible for the physicians's bill and can claim reimbursement from the carrier of 80 percent of the portion that equals the "allowed" charge.

Variation in the Method

In certain respects, it would seem that there would not be the basis of an analytical economic investigation of the Medicare method of reimbursement, or, at least, of many interesting hypotheses that suggest themselves with respect to it. The deductible is set uniformly at \$50; the coinsurance rate is set uniformly at 20 percent. The physician's fee ought to be screened in the same way by every carrier. In view of the absence of variability in the principal elements, there would be no way to measure the effects of the method of reimbursement from the effects of Medicare as such.

Fortunately for purposes of the research, this invariance turns out to be by no means absolute. The deductible can in fact vary between zero and \$50, primarily because of the provision permitting carryover of deductible from year to year, but also because it may be reimbursed from insurances outside the system, e.g., private insurance companies offering complementary insurance, Medicaid, prepaid group plans. The coinsurance rate can vary between zero and 20 percent because the nonreimbursable 20 percent can also be reimbursed, wholly or in part, by insurance outside the system. In addition, "reasonable" charge determination as envisaged by Medicare was not uniformly practiced in the 1966-69 period.

of controlling the use of services, they are more properly elements of Medicare as insurance.

It took some time for all of the Medicare Part B carriers to understand the customary-prevailing-reasonable standard (CPR), and to develop the data for screening a physician's charge accordingly. In the meanwhile, CPR criteria were applied differently by different carriers, substituting fee schedules for "customary" charges, updating them more or less frequently than prescribed, employing anywhere between the 75th and 95th percentile test for determining "prevailing," etc.

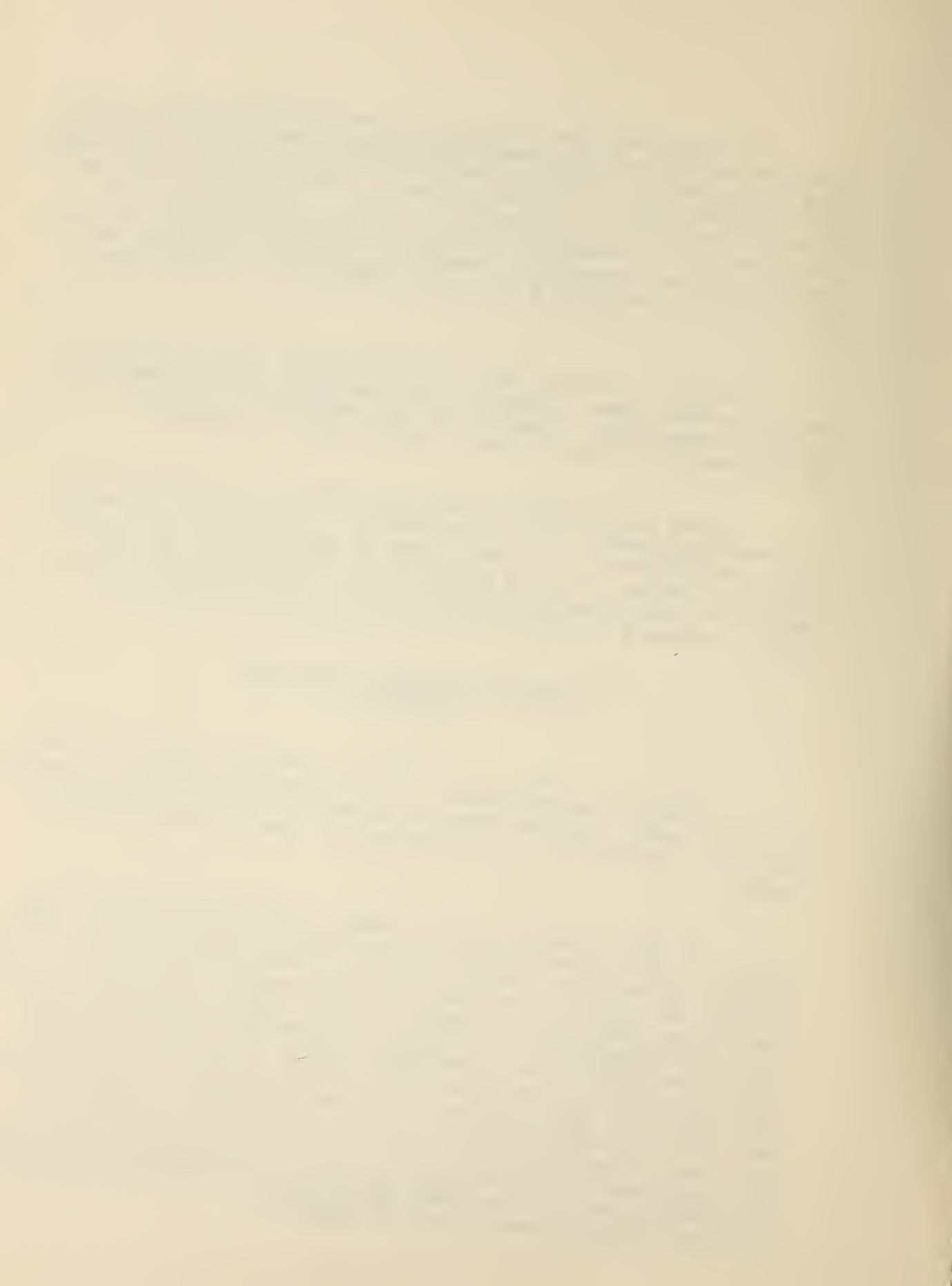
Lastly, carriers vary in experience with respect to the assignment rate, benefits per enrollee, the percentage by which physicians' charges on the average are reduced, and the percentage of physicians' bills that are reduced.

These variations and divergences in the elements of the Medicare method of reimbursement, from person to person and from carrier to carrier, made it possible to reach certain conclusions in this study about the effects of the method of reimbursement on physicians' fees and of out-of-pocket expenses on utilization of physicians' services.

The Aims of Research and the Method

Needless to say, it is easy to employ the term "Medicare method of reimbursement" in an ambiguous manner in which it could mean anything from an allusion to the CPR reimbursement of physicians to all elements of the method taken together.

In the course of this study we became convinced that the particular research questions should determine the definition of the term. As the aims of research differed, so the meaning of Medicare method of reimbursement could differ from one investigation to the next. But in any one context, the term was unambiguous. Consider: the method of determining the allowed charge may influence fees; the latter, along with the coinsurance rate, may in turn influence utilization. The method of determining the allowed charge may also influence the assignment rate; and the latter, along with fees and the coinsurance rate, may in turn influence utilization. How fruitless such research will be if the Medicare method of reimbursement is not defined precisely or if its elements are not distinguished from one another.



The deductible, the coinsurance rate, assignment, and the method of determining the allowed charge are not the whole of the Medicare method of reimbursement defined comprehensively. But a total definition does not lend itself to the attainment of research aims; only narrowed, unambiguous definitions prove useful.

Important Sources of Data

The data used in this investigation are mainly statistics on the Medicare program developed and maintained by the Office of Research and Statistics, Social Security Administration. (They are comprehensively described in A. Krute and others, Statistical Elements of Medicare, Social Security Administration, Office of Research and Statistics, September 1968.) Among our sources are:

1. The "reasonable charge" statistics of physicians' actual and allowed charges for a 5 percent sample of enrollees
2. A classification of carriers according to procedures used in "screening" charges to arrive at allowed charges (these data originated in the Bureau of Health Insurance, Social Security Administration)
3. The Current Medicare Survey, a household survey of utilization experience of more than 4,000 Medicare enrollees, conducted monthly by the Bureau of the Census
4. Actual and allowed charges for specified procedures for Medicare and non-Medicare business from selected Blue Shield Plans
5. Data from a variety of sources using alternative methods of reimbursement.

Appendixes A and B treat in detail the chief statistics that were employed, being variable name dictionaries giving sources and years, discussing the preparation of data in the case of the Current Medicare Survey tapes, noting adjustments, presenting additional tables, etc. Appendix A handles the Current Medicare Survey; appendix B, the "reasonable charge" statistics and some of the other sources.

II. THE EFFECTS OF MEDICARE METHOD OF REIMBURSEMENT ON PHYSICIANS' FEES

"If There Had Been No Medicare...": Physicians' Fees Generally, 1952-69

In the second part of the 1960's, the overall level of physicians' fees rose sharply. It so happens, also, that the inflation accelerated in this period and that Medicare Part B was enacted, extending up to 80 percent coverage for physicians' bills to some 20 million aged persons, many of whom had previously had no health insurance protection. In addition, the Medicare legislation provided that the basis of reimbursement for physicians' fees would be the "reasonable" fee-for-service charge, considering the physicians' customary charge and the charge prevailing in the community. The econometric model we are going to describe was developed to separate these and other influences from one another, to measure their effects on the variation of the physicians' fees and to point to policy inferences.

The model is formulated in terms of annual percentage changes for the years 1952-69. The dependent variable is the annual percentage change in the Bureau of Labor Statistics physicians' fee index component of the Consumer Price Index. The factors whose marginal or additional influence on the overall level of physicians' fees are assessed are:

1. The rate of change in the Consumer Price Index (CPI), representing the general inflation. From the point of view of the physician, inflation produces two effects: (a) a change in the relative price of his services and substitution of them for other goods and services; and (b) an increase in the prices of the elements of his operating cost. The correlation of CPI charges with the dependent variable will be said to represent a cost-push effect on physicians' fees.

2. The rate of change in the percentage of third-party payment for medical services (which includes the insurance benefits from the insurance companies and the health expenditures subsidized by governments).

3. The rate of change in the percentage of population insured for medical expenses.

4. The rate of change in the number of people insured. (Variables 2 through 4 may be considered alternative measures of insurance factors; they include all insured, those under 65 as well as those 65 and over.)

5. The rate of change in per capita income. (The insurance variables and per capita income represent demand-pull effects on physicians' fees.)

6. The rate of change in physicians per 100,000 of population (the supply term).

7. A dummy variable representing the years before and after the introduction of the Medicare program.

Our analytical technique is Multiple Least-Squares regression. Table 1 furnishes a summary of the regressions we considered.

Earlier preliminary results indicated that the period 1966-69, or the years since the introduction of Medicare, marked a departure from past trends in the BLS physicians' fee index, the CPI and the percentage of third-party payment. The fee index increased by 3.3 percent per annum on the average in 1952-60 and by 2.8 percent in 1961-65; in 1966-69 it averaged 6.3 percent per annum. The CPI increased by 1.5 percent in 1952-60 and by 1.3 percent in 1961-65; in 1966-69 it averaged 3.8 percent per annum. The percentage of third-party payment increased by 5.4 percent in 1952-60 and by 1.5 percent in 1961-65; it averaged 11.2 percent per annum in 1966-69. Physicians' fee index inflation factors and insurance benefits simultaneously had sharp increases after 1966. The multiple regression technique was used to determine their cause-effect relationships.

Of the eight equations shown in table 1, we judge equation 3 to be the best. Before discussing this equation in detail, let us look at the other equations both for what they have to tell us and for how they compare with equation 3. Equations 7 and 8 are similar to equation 3; the first

Table 1. Equations Explaining the Rate of Change in Physicians' Fees

Equation number	Constant	Rate of change in CPI (inflation factor)	Rate of change in pct. of third party payment	Rate of change in pct. of insured	Rate of change in no. of insured	Dummy	Rate of change in per capita income	Rate of change in phys. per 100,000 pop.	R
1.....	3.1386					3.2014 (.3812)			0.897
2.....	2.9047		.0581 (.0308)			2.7829 (.4178)			.911
3.....	2.3174	.3682 (.1306)	.0756 (.0262)			1.7635 (.5006)			.940
4.....	1.7876	.7013 (.1198)	.1244 (.0295)						.893
5.....	1.928	.394 (.132)	.0831 (.0269)			1.415 (.587)	.0875 (.079)		.9413
6.....	1.95	.394 (.137)	.0837 (.028)			1.378 (.64)	.0757 (.103)	.0535 (.282)	.9364
7.....	2.133	.354 (.132)		.129 (.047)		2.001 (.473)			.938
8.....	1.912	.353 (.129)			.128 (.044)	2.125 (.445)			.941

Note: Entries in parentheses denote standard errors.

employs "the rate of change in the percentage of population insured," and the second, "the rate of change in the number of population insured", in place of "the rate of change in the percentage of third-party payment." Otherwise, the three equations are the same. The coefficients of the insurance factor and the dummy variable in both equation 7 and equation 8 are larger than equation 3. However, the coefficient of the rate of change in the CPI is practically the same in the three equations, as well as the value of the multiple correlation coefficient. Equation 3, we feel, is the most satisfactory equation in terms of economic formulation and for interpretation. Chart 1 depicts how well equation 3 replicates actual experience; chart 2 similarly depicts equation 8.

The supply^{1/} of physicians has no statistically significant impact on the rate of change in physicians' fees generally. Although the variable is not significant, one would expect its sign to be negative, indicating that an increase in the relative supply of physicians tends to ease pressures causing the BLS physicians' fee index to rise. Here the sign is positive.

The rate of change in per capita income, although somewhat more meaningful, also has no statistically significant impact. Per capita income changes would act on physicians' fees by shifting the demand curve for physicians' services. Given the fact that to some extent the demand for health care is a matter of necessity, one cannot expect this income elasticity of demand to be high. The establishment of programs like Medicare and Medicaid has further reduced

^{1/} Equations 1-3, 5, 6 can be regarded as a stepwise multiple regression. Step one (equation 1) introduces a dummy variable representing all years before 1966 by zero (0) and all years from 1966 by one (1). The time dummy is chosen first because it has the highest simple correlation with the dependent variable. Step two (equation 2) adds the influence of the extension of health insurance coverage; step three (equation 3) adds the cost-push effect of general inflation. The regression coefficients of equation 3 are highly significant, and their signs are as expected; then, step four (equation 5) adds the influence of another demand-pull variable, per capita income; finally, step five (equation 6) adds the relative supply of physicians. The sequence of values of the important multiple correlation coefficient is 0.897, 0.911, 0.941, 0.936.

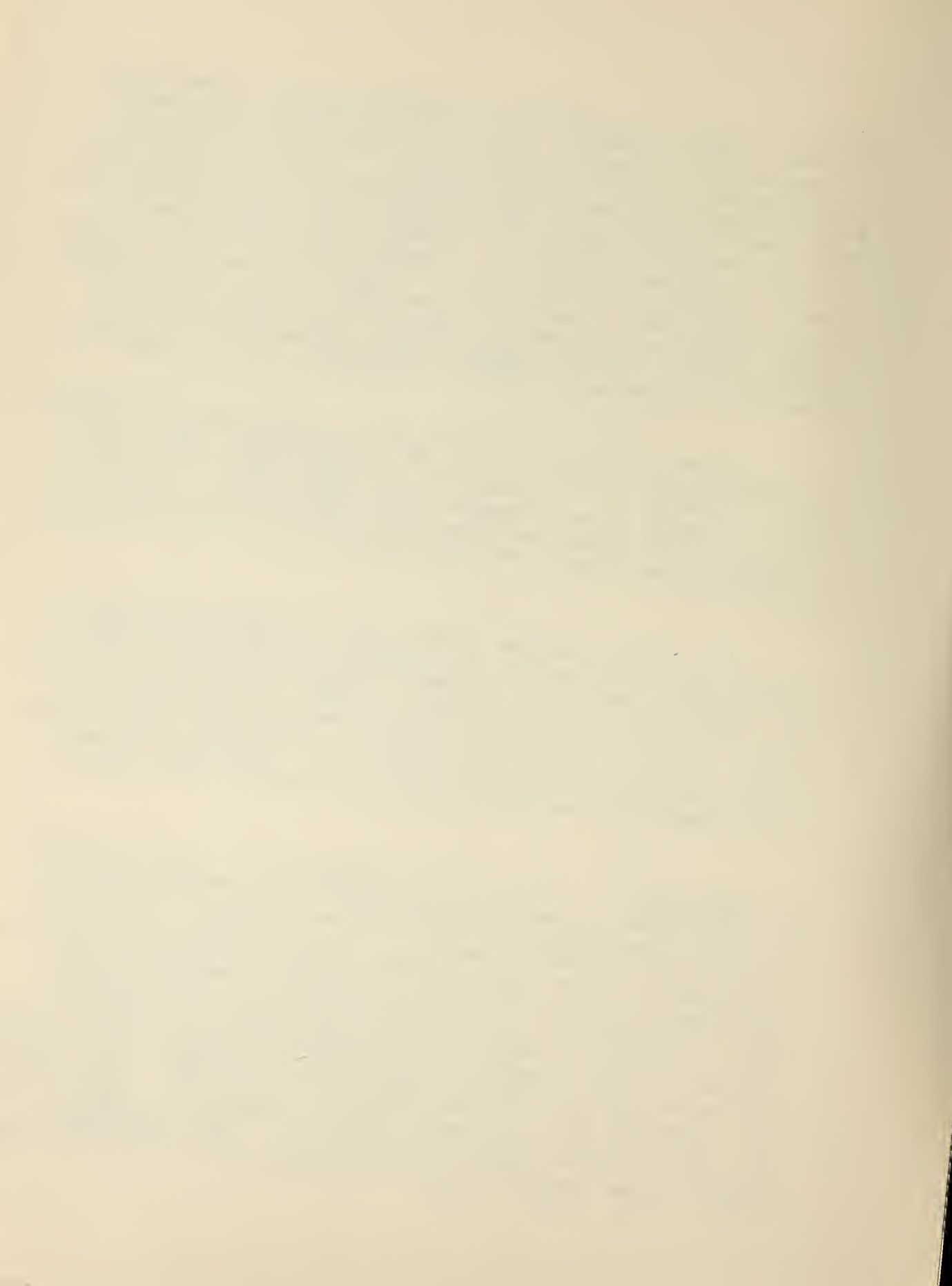


Chart 1. Rate of Change in Physicians' Fees

$$\hat{Y} = 2.317 + 1.762D + 0.368X_1 + 0.076X_2$$

(.27) (.131) (.026)

$$\bar{R} = 0.9404$$

Y = Rate of change in physicians' fee index
D = Medicare dummy. Before 1966, D = 0, 1966 and after, D = 1
X₁ = Rate of change in consumer price index
X₂ = Rate of change in third-party payment/total

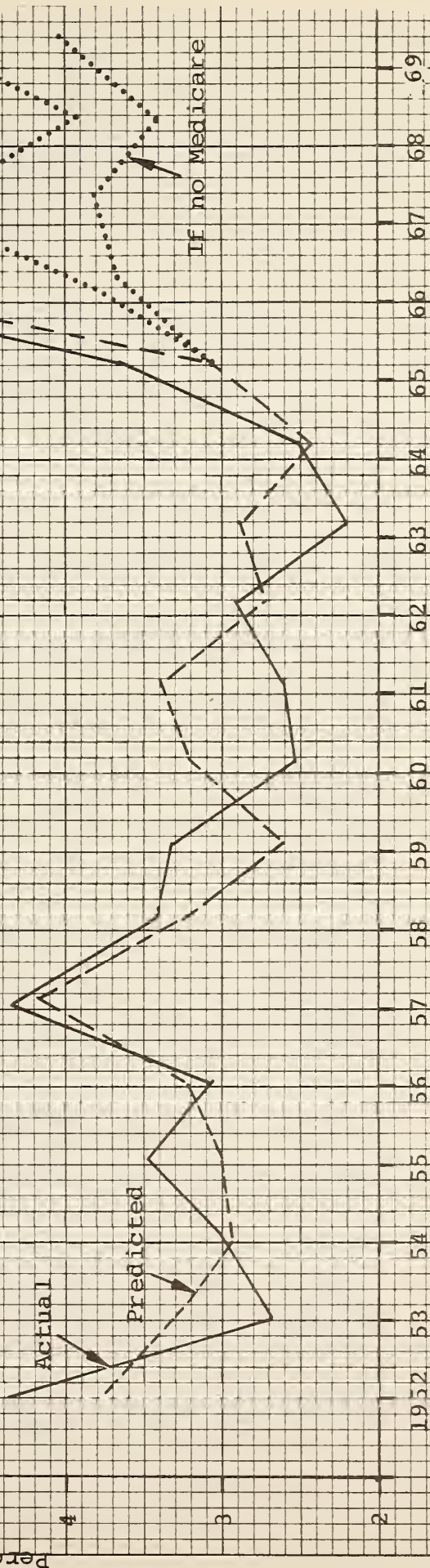




Chart 2. Rate of Change in Physicians' Fees

$$\hat{Y} = 1.91248 + 0.352695X_1 + 0.128108X_2 + 2.12478D$$

(.364) (.129) (.044) (.445)

$$\bar{R} = 0.941$$

If no Medicare
temporal shift

If no medicare

Actual

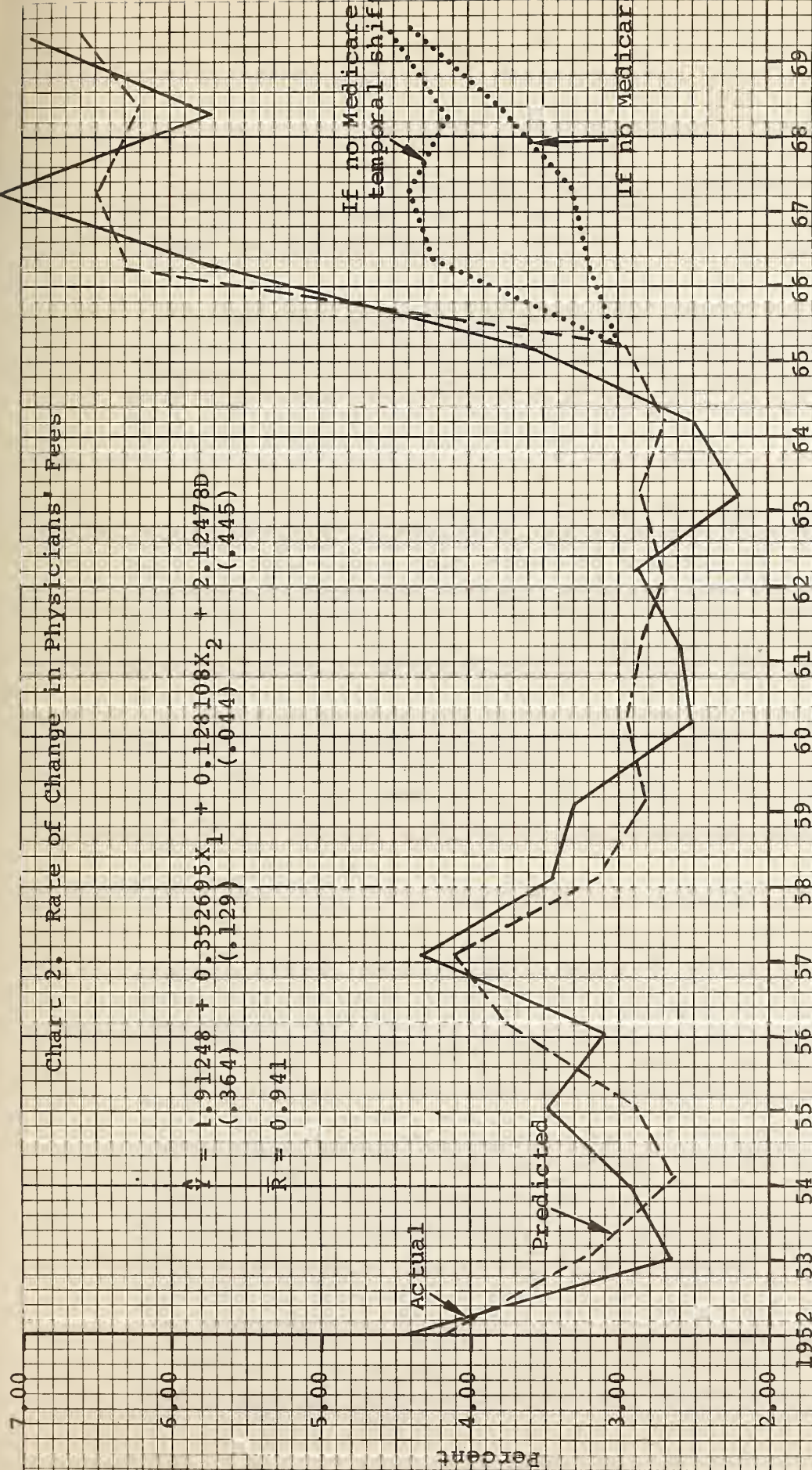
Predicted

Y = Rate of change in physicians' fee index

X₁ = Rate of change in consumer price index

X₂ = Rate of change in number of population insured

D = Medicare dummy. Before 1966, D = 0; 1966 and after, D = 1



the dependence of demand on income. Probably, then, it is not surprising that the effect of per capita income changes proved not significant.

One may note that as the per capita income and supply of physicians' variables are added to equation 3, the coefficients of the three independent variables of equation 3 retain their high significance and do not change very much. This implies that the roles played by these three variables are very stable and significant.

In step one (equation 1) we see what is gained by employing a dummy variable to represent a temporal effect; that is, the trend over time: 80 percent of the variation in the annual change in the fee index is explained by it alone. Equation 4, which drops the dummy variable, indicates what it contributes that is not already contributed by cost-push and demand-pull effects. True, the multiple correlation coefficient falls only slightly, from 0.940 to 0.893. But the coefficients of the inflation and insurance factors are very different from equation 3; the first practically doubles, while the second becomes about 1 1/2 times as great. This suggests that without the dummy the coefficients of these two variables will be seriously biased, and that the Medicare factor has a very important impact on the escalation of physicians' fees.

In equation 3, the coefficient of the time dummy is clearly significantly different from zero. A distinction between two periods, 1952-65 and 1966-69, is a factor in the explanation of physicians' fee behavior in the whole period 1952-69. The effect of this is that the relationship between rates of inflation and of extension of health insurance coverage, on the one hand, and changes in physicians' fees, on the other, shifts in 1966-69. To illustrate: given zero rates of inflation and of health insurance extension throughout the 1952-69 period, the BLS physicians' fee index still would rise by 2.3 percent per annum in the 1952-65 period (its underlying trend, so to speak, in the period); but, in the 1966-69 period, it still would rise by 4.1 percent per annum. This constant difference between the two periods of roughly 1.8 percent per annum is brought about by the time dummy. The rates of inflation and health insurance extension did, in fact, change, but the additional 1.8 percent per annum growth in the BLS physicians' fee index between the two periods is over and above what can be accounted for by their impact.

The 1966-69 period coincides with the existence of the Medicare program. (It is of course concurrent also with all other social phenomena that came into existence in 1966, remained in existence in the period, and could be casually related to physicians' fee behavior.) Medicare not only brought a good deal of health insurance to the aged; it also reimbursed the aged in a certain way and directed intermediaries (the Part B carriers) to determine reimbursable charges on a certain basis. The effect of Medicare qua insurance is accounted for by the insurance variable. The statistical significance of the time dummy suggests strongly that this coefficient is quantifying partly, if not exclusively, the effect on physicians' fees of the other dimension of Medicare -- its method of reimbursement. Although it would not be correct to infer that the temporal effect quantifies the pure effect of the Medicare method of reimbursement on the general level of fees, one may broadly interpret equation 3 as separating the effect of Medicare qua insurance from the effect of Medicare qua method of reimbursement.

Equation 3 replicates actual experience well; the approximations are especially good since 1965 (chart 1). In view of this, let us employ it as a reference to explore two questions:

1. What would have happened to physicians' fees generally if there had been no Medicare, i.e., no health insurance for the aged and, by implication, no Medicare method of reimbursement?

2. What would have happened if the aged had acquired all the health insurance coverage they acquire under Medicare but without a Medicare program, i.e., health insurance for the aged but no Medicare method of reimbursement?

No Medicare in the sense of the first question would have meant an annual rate of change in the BLS physicians' fee index that would have been about 3 percent lower than it actually was in the period 1967-69 (2 percent lower in 1966). An additional 3 percent rise in physicians' fees per annum might be termed the total impact of Medicare. The path that fees might have taken in the absence of Medicare is labeled "If no Medicare" on chart 1.

The answer to question 2 is simply the value of the coefficient of the time dummy. The Medicare method of reimbursement alone may have contributed 1 3/4 percent per annum

to the rise in physicians' fees. Or, as the line labeled "If no Medicare temporal shift" shows, the rate of change in physicians' fees might have followed a path about $1\frac{3}{4}$ percent lower than it did. The total impact of Medicare on the overall level of fees could be broken down as $1\frac{1}{4}$ percent per annum being due to Medicare qua insurance, and $1\frac{3}{4}$ percent per annum being due to Medicare qua method of reimbursement.

Chart 2 depicts essentially similar relationships. Equation 8 is employed as predictor. The total effect of Medicare is not so high, say, a 2.5 percent per annum additional rise in physicians' fees. The effect of the Medicare method of reimbursement dominates: it is 2.1 percent per annum, leaving about $1\frac{1}{2}$ percent per annum to Medicare as insurance.

Methodological Note: Three Alternative Models

Three other models were tried:

1. Replacing the rate of change (annual growth) of each variable by the actual value

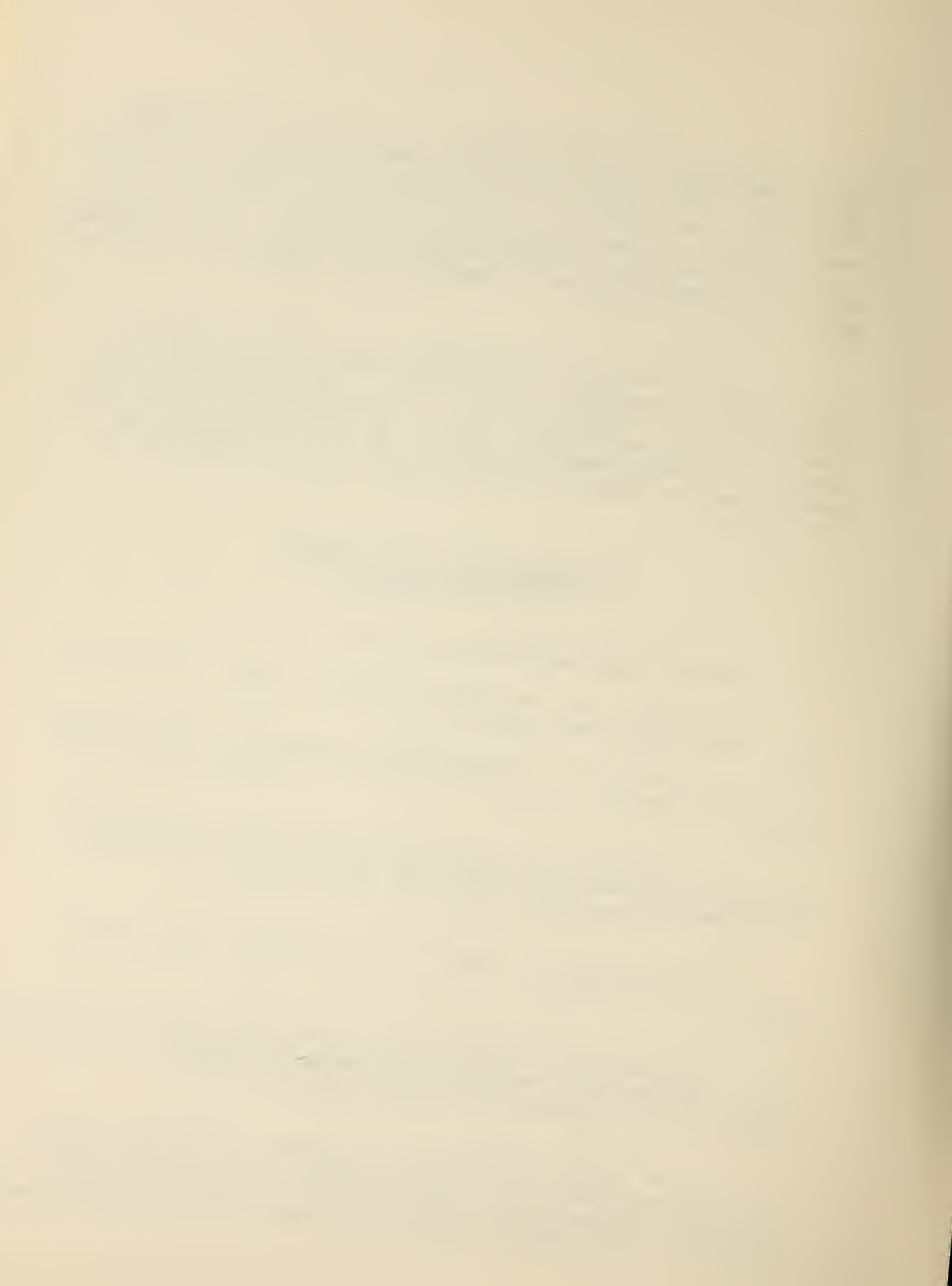
2. Employing a linear price adjustment (this Koyck model will receive further attention in the following section)

3. Treating the insurance factor as an endogenous variable and employing Two-Stage Least Squares or other simultaneous-equation estimating techniques.

Let us mention some of the drawbacks under each in turn.

The first alternative runs into the problem of extreme multicollinearity among the independent variables, making it impossible to distinguish their separate effects.

The second alternative regresses the current year's physician's fee on the previous year's and on the other variables (using their actual values). No one will be surprised to learn that the previous year's fee explains a very



high percentage of the variation in the current year's fee. But it is hard to believe that inflation and insurance-related factors play no role.

The model we employ is superior to these two alternatives because the multicollinearity problem is substantially reduced, making it possible to isolate through statistical inference the effect of many of the factors.

Turning to the alternative of a simultaneous-equation model, it could be argued that the coefficients obtained are biased and inconsistent because the percentage of third-party payment is in fact an endogenous variable in the health-care system of relationships.

Where the number of observations is large, simultaneous-equation methods will improve the consistency of estimates. However, Monte Carlo Studies^{1/} show that if the sample size is relatively small, the results obtained from the Ordinary Least Squares (OLS) method usually are not worse than the results obtained from Two-Stage Least Squares (2SLS) or other simultaneous-equation methods. OLS usually gives smaller standard deviations and greater precision for regression coefficients in the case of small samples, although the bias may be larger than that obtained from simultaneous-equation methods. If we use the mean square error (MSE) to measure the quality of a regression coefficient, OLS, in a case like ours, consistently gives the better result.

Medicare Physicians' Fees: 1967-69

Factors Influencing Increases

The Determination of Reasonable Charges

We pass from a consideration of the behavior of Medicare physicians' fees generally to a consideration of the behavior of physicians' fees under Medicare, and we concentrate our attention on an element of the Medicare method of

^{1/} I. Johnston, Econometric Methods, 2 ed. (New York: McGraw Hill Inc., 1963), pp. 408-420.

reimbursement that we believe is at the heart of that behavior: the criteria adopted for the determination of "reasonable" charges. Table 2, in its first row, gives an indication of the magnitude and range of changes in Medicare physicians' fees, distinguished by census regions. We will refer to this table again when we analyze the determinants of the other aspects of the method of reimbursement.

The basic goal of the Medicare program is to lift the major portion of the economic burden of health care from the aged and thereby give them the same chance of satisfying their health care needs as is given others by adequate insurance or income. "In line with this basic goal, payment for medical services on behalf of Medicare beneficiaries was designed to meet the going price for these services."^{1/} The "going price" was to be determined by the application of reasonable charge criteria embodied in the law. (Implicit here is the assumption that the determination of the going price by a set of criteria will not affect its behavior. These determinations would simply reflect the going price; they would not affect it. The previous section throws doubt on this assumption. Reasonable charge determinations could both reflect and influence physicians' fee behavior.) Neither the administrative systems nor the data required to implement the customary and prevailing charge criteria embodied in the law existed at the start of the program. "As a result, it was necessary to begin processing claims on the basis of the best systems [Medicare Part B] carriers were initially able to develop using data available." Not only was the Medicare program committed to the dubious goal of "gearing program payment to the going price for physicians' services"; but also, it did not even have the technical basis for doing so. By 1970, the Social Security Administration was still trying "...to achieve...full implementation of the reasonable charge criteria in the law and...in a way that...inhibits rather than encourages fee escalation...to improve application of reasonable charge criteria...[and to refine] the guidelines followed by the carriers...." (This is said not to criticize the Social Security Administration, but to describe the difficulty of the task it faced.) Inherent in trying to pay the going price for medical services according to certain determinations or methods of reimbursement is the fact that it is all but impossible to inhibit the escalation of this price.

^{1/} All full or partial quotations in the next few paragraphs are from a Bureau of Health Insurance, Social Security Administration, staff paper dated January 10, 1970.



Table 2. Summary of Medicare Part B Carrier Statistics: Rate of Change in Physicians' Charges, Assignment Rate, Supplementary Medical Insurance (SMI), Reimbursement per Enrollee, Reduction in Physicians' Charges, and Services Where Allowed Charge

Less Than Physicians' Charge

Medicare Part B carrier statistics	All ^a		West		South		North Central		Northeast	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Rate of change in mean physicians' charges, 1967-69 (percent)										
All services....	13.65	6.83	19.67	5.82	10.01	6.59	18.66	6.38	13.19	3.20
Medical care....	20.97	4.76	26.92	4.56	20.98	2.42	22.27	7.03	17.72	2.04
Assignment rate (percent)										
1968.....	56.24	11.96	59.93	9.85	54.99	12.99	51.27	7.75	56.04	12.38
1969.....	60.63	11.22	63.46	10.61	61.31	11.62	56.91	10.46	60.74	10.77
SMI reimburse- ment per en- rollee (\$)										
1967.....	34.78	8.76	43.46	8.53	34.06	9.71	28.03	3.29	36.56	5.81
1968.....	71.10	16.93	78.97	15.44	70.45	20.82	61.83	4.82	74.63	9.22
1969.....	82.06	20.04	90.21	14.12	83.82	26.11	67.56	9.15	85.20	10.10
Reduction of physicians' charges, all services (pct.)										
1967.....	1.91	1.12	1.25	1.03	1.53	0.73	2.82	1.65	2.17	0.62
1968.....	3.41	1.96	1.88	1.11	3.37	2.23	4.61	2.05	3.41	1.07
1969.....	4.93	1.71	4.56	1.52	4.45	1.80	6.24	1.61	4.96	1.21
Allowed charge less than phy- sicians' charge, all services (pct.)										
1967.....	3.49	2.82	2.56	2.49	2.40	1.55	6.47	4.45	3.60	1.09
1968.....	7.35	5.41	5.31	3.81	6.44	4.99	12.32	7.37	6.65	2.90
1969.....	12.65	6.16	16.98	7.42	10.25	4.48	18.04	6.42	10.91	4.11

continued-

Table 2. continued--

Note: Both mean and standard deviation are weighted.

X_{it} : X-statistic of the i-th carrier at time, t.
X could be the rate of change in physicians' charges, the assignment rate, etc.

N_{it} : Number of all services of the i-th carrier, at time t

$\bar{X}_t$: Weighted mean of X_{it}

$(S.D.)_t$: Weighted standard deviation of X_{it}

where

$$\bar{X}_t = \frac{\sum_i N_{it} \cdot X_{it}}{\sum_i N_{it}};$$

$$(S.D.)_t = \left\{ \frac{\sum_i N_{it} (X_{it} - \bar{X}_t)^2}{\sum_i N_{it}} \right\}^{1/2}$$

For the rate of change in physicians' charges, N_{it} & $\sum N_{it}$ are from 1969; in the case of SMI reimbursement per enrollee, N_{it} & $\sum N_{it}$ are SMI enrollment rather than all services.

a/ The sample size is uniformly 35 carrier. These are listed in appendix B.

Source: Assignment rate, 1969 -- RS Health Insurance Statistics, U.S. Department of Health, Education and Welfare, Social Security Administration, Office of Research and Statistics, January 10, 1972.
Assignment rate, 1968 -- N. Dickoff of the Social Security Administration, Office of Research and Statistics.
SMI reimbursement -- Annual Statistical Supplement, Social Security Bulletin, June 1970, table 3.
All others -- Reasonable Charges Tabulations from 5 percent sample of medical insurance bills, Social Security Administration, Office of Research and Statistics, table 2A, as of December 1971.

A Bureau of Health Insurance, Social Security Administration letter of April 1971^{1/} described the "full" reasonable charge criteria in the law. Excerpts from this letter follow.

A. Data Base and Effective Date of F.Y. 1972 Screens

Carriers should develop revised reasonable charge screens based on charge data for all of calendar year 1970 and implement them for all claims received on or after July 1, 1971.

B. Customary Charges

Customary charge calculations must be based on charge data derived from claims processed or from claims for services rendered during all of calendar year 1970. The 1970 data base used to establish customary charge limits should, to the maximum extent possible, include information available from other sources than Medicare claims, including the carrier's own programs, other insurance programs, and the Federal Employee Health Benefit Program.

In calculating the customary charge limit for a given service, each charge the physician or other person has made for the service should be arrayed in ascending order. The lowest actual charge which is high enough to include the median of the array of charge data should then be selected as the customary charge limit.

C. Prevailing Charges

The prevailing charge limits used by carriers to process claims received on or after July 1, 1971, must be calculated using the 75th percentile of the customary charges determined in accordance with Item B. above. In the calculations, each customary charge should be weighted by how often the physician or other person rendered the service (as reflected by the data the carrier used to derive the customary charges).

The proper procedure for establishing revised prevailing charge screens based on the 75th percentile is illustrated by the following example:

Procedure: Routine Follow-Up Office Visit

Step 1

Establish a frequency distribution listing each customary charge in ascending order together with the corresponding frequency of the services rendered:

^{1/} Bureau of Health Insurance, Social Security Administration, Department of Health, Education and Welfare, Part B

Number of Services Rendered by Physicians Customary Charge With Customary Charges as Indicated			Cumulative Services
\$5	1402		1402
\$6	1115		2517
\$7	1680		4197
\$8	Total = 803		5000
	5000		

Step 2

To determine the prevailing charge, select the lowest customary charge which is high enough to include the customary charges of the physicians who rendered 75 percent of the cumulative services during the year from which the customary charge data were derived.

In the above example, 75 percent of the total of 5,000 services equals 3,750 services. The prevailing charge is, therefore, \$7. (A total of 2,517 services were rendered by the physicians with \$5 and \$6 customary charges, and an additional 1,680 services were rendered by the physicians with \$7 customary charges. The 3,750th service was thus rendered by a physician with a \$7 customary charge.) The prevailing charge in the example actually covers almost 84 percent of the services. Generally, although the 75th percentile is selected as the prevailing limit, the fact that the same charges are made many times may mean that a larger percentile is also covered in full.

G. Other Instructions

As we have indicated above, existing instructions not specifically changed by this letter remain in effect. These instructions take into account the need (a) to establish separate prevailing charge screens to recognize variations in charges due to specialty practice where the medical community has established such differentials, (b) to properly identify the localities used as the framework for establishing prevailing charge limits, (c) to use non-Medicare claims experience and generally to make sure that charges allowed as reasonable for Medicare beneficiaries do not exceed the charges physicians and other persons make to patients generally, and (d) to deal adequately with certain problems such

as fragmentation of charges and mark-ups charged by physicians for services actually rendered by independent laboratories.

The reasonable charge should be the lowest of three types of charges: the actual, the customary, the prevailing. Moreover (although this was not being implemented fully at the time of the letter quoted above), the reasonable charge should not be higher than the carrier was paying for the same procedure in its own business. Customary charges should not be updated more frequently than every 12 months; it is clear from the letter that in Fiscal 1972 there is implicitly an 18-month lag between reasonable charges and actual physician charges (the going price).

There were wide departures in 1967 from the customary-prevailing-reasonable (CPR) criteria that have just been described. These departures from CPR are summarized in table 3.

Table 3 actually presents a detailed scheme for analyzing and defining a method of determining the reasonable charge.^{1/} There are five distinct aspects. Each aspect is broken down into a set of classifications that are by nature exhaustive and not overlapping; all Medicare Part B carriers have to fit in somewhere. As an important byproduct, for us, the entire contents of table 3 in this form can be translated into dummy or qualitative variables to be employed in regression equations. A great variety of methods of reimbursement

^{1/} CPR or the Medicare method can only be approximated in the terms of table 3:

1. No fee schedule
2. Recognizes specialty
3. Frequency of updating 6-12 months
4. All charges as sources of data used for prevailing charges
5. Other as definition of prevailing charges.

Obviously, "no fee schedule" does not therefore mean that customary charges using the median to measure their central tendencies were employed; or "frequency of updating 6-12 months," that updating occurred every 12 months; or "other as definition of prevailing charges," that the Part B carrier was employing the 75th percentile. But this set at least does not rule out the intent of Medicare.

Table 3. Distribution of Medicare "Reimbursement Methods"
Among Carriers, 1967

	Where carrier is same as state	All carriers ^{a/}
Classification of fee schedule 1:		
No fee schedule.....	11	17
Fee schedule (R.V.S. or ceiling)...	26	42 ^{b/}
Total.....	37	59 ^{b/}
Classification of fee schedule 2:		
No fee schedule.....	11	17
Fee schedule (ceiling).....	8	16
Fee schedule (R.V.S.).....	18	26 ^{b/}
Total.....	37	59 ^{b/}
Recognizes specialty:		
No.....	22	36
Yes.....	15	24
Total.....	37	60
Frequency of updating:		
Above 1 year.....	8	12
6-12 months.....	11	17
Less than 6 months.....	6	12
Irregularly.....	12	18 ^{b/}
Total.....	37	59 ^{b/}
Sources of data used for prevailing charges:		
All charges (Medicare and non- Medicare).....	14	23
Medicare only.....	17	23
"Own business" only.....	6	11
Total.....	37	57 ^{c/}
Definition of prevailing charges:		
Other prevailing charges.....	6	12
80-95 percentile of charges (cus- tomary, Medicare, non-Medicare, all).....	11	16
Fee schedule or R.V.S.....	20	32
Total.....	37	60
Type:		
Non Blue Shield.....	19	28
Blue Shield.....	18	32
Total.....	37	60

^{a/} Only carriers from the 50 states and Washington, D.C. , are in-
cluded. See appendix B for the listings.

^{b/} Minnesota B/S not available.

^{c/} Ohio B/S, Kansas B/S, and Maryland B/S not available.

Table 3. continued--

Source: Basic data with respect to carriers' adherence to the "CPR" method of determining allowed charges, 1967 survey, provided by members of Division of Provider and Medical Services Policy, Division of Contractor Operations of Bureau of Health Insurance, Social Security Administration, Department of Health, Education, and Welfare.

was being employed at the outset. The variety by no means encompassed the full range of methods, but it appeared sufficient to make it possible to explore the impact of the method of determining the reasonable charge on physicians' fee behavior.

A Nonlinear Price Adjustment Model

Our objectives in the present section are:

1. To investigate whether the method of determining the reasonable charge was a factor influencing the increases in Medicare physicians' fees in 1967-69.
2. To investigate what role socioeconomic factors played in this regard
3. To investigate what role the acceptance of assignments played
4. To deduce some policies from the results.

There are as many as eight price-adjustment models to choose from before proceeding to test and estimate; i.e., linear and nonlinear types, general and Medicare variants, Two-Stage Least Squares (2SLS) and Ordinary Least Squares (OLS).^{1/} We feel the best one is the nonlinear, Medicare variant, employing OLS multiple regression.

We assume here that the annual growth rate of Medicare fees is a function of (1) the current method of reimbursement, socioeconomic context, and the rate of acceptance of assignments, etc., X_t ; and the previous year's fees, P_{t-1} , so:

$$\frac{P_t - P_{t-1}}{P_{t-1}} = \beta_0 + \beta_1 X_t + \beta_2 P_{t-1} \quad (1)$$

Equation 1 can be rewritten as

$$P_t = (1 + \beta_0 + \beta_1 X_t) P_{t-1} + \beta_2 (P_{t-1})^2 \quad (2)$$

^{1/} See Methodological Note at the end of this section.

Equation 2 implies that the current year's price is a non-linear function of X_t and P_{t-1} .

From equation 2 we obtain

$$\partial P_t / \partial X_t = \beta_1 (P_{t-1}) \quad (3)$$

$$\partial (P_t / P_{t-1}) / \partial X_t = \beta_1 \quad (4)$$

$$\partial P_t / \partial P_{t-1} = (1 + \beta_0 + \beta_1 X_t) + 2\beta_2 (P_{t-1}) \quad (5)$$

The model implies:

1. The effects of method of reimbursement and socioeconomic variables on the current level of physicians' fees are a function of the previous year's level (equation 3 above).

2. Their effects on the annual rate of change of fees are a constant (equation 4 above).

3. The relation between this year's and last year's price is a function of last year's price and method of reimbursement and socioeconomic variables. The relation will be different for different carriers, i.e., as the method of determining reasonable charges and the socioeconomic context vary.

4. Assuming that X_t changes little or not at all and that β_2 is negative, Medicare fees will grow at a decreasing rate; or, of two carriers with the same method of reimbursement and in the same socioeconomic context, the one with the higher previous year's price will grow more slowly. Consequently, any difference in the level of fees between them will in time be eliminated.

5. If Medicare fee differentials are not disappearing, it may be due to intercarrier variations in method of reimbursement and socioeconomic context. An important implication here is that uniformity of reasonable charge screens among carriers in the 1967-69 period would certainly have lessened some of the Medicare price level differences that existed among them in 1967.

To apply either of these two price-adjustment models to Medicare physicians' fees in 1967-69, we must pay more attention to the definition of P_{t-1} , the previous year's

price. In the general case, one might assume that a physician takes the average actual charge of the previous year for P_{t-1} . This is the usual assumption in price-adjustment models. For the special case of Medicare there is acceptance of assignments introducing a complicating element. For physicians who never accept assignments, the general case applies, but for physicians who always accept assignments, P_{t-1} cannot be the average actual charge; it must be the average allowed charge of the previous year. Since few physicians either never accept assignments or always accept them, the most reasonable approach in applying these models to Medicare fees is to define P_{t-1} as the weighted average of actual and allowed charges, the weights being 1 minus the net assignment rate (1-ASR) and the net assignment rate (ASR), respectively.^{1/}

Letting P_{t-1} now stand for the previous year's average actual charge and defining AP_{t-1} as the previous year's average allowed charge, the previous year's price can be written as:

$$P_{t-1}(1-ASR)_{t-1} + AP_{t-1}(ASR)_{t-1}$$

With this modification arising out of the Medicare case, we distinguish two variants under both the linear and the nonlinear price-adjustment model:

1. P_{t-1} and $(ASR)_{t-1}$ are separate independent variables
2. The previous year's price as defined for the case of Medicare, above.

In addition, since the net assignment rate could be considered an endogenous variable in a model of Medicare, purging the net assignment rate may be an essential step prior to proceeding with an estimation of the Medicare physicians' fee relationship. Both 2SLS and OLS methods were tested. The results are not very different in the two cases.

^{1/} We are assuming that both actual and allowed physicians' charges are suitable substitutes for the relevant realized charge. A doctor who did not accept assignment may have charged \$10 but collected \$5, and one who accepted assignment may have been allowed \$9 but also collected \$5.

Our dependent variable is the total growth rate of average actual Medicare physicians' fees from 1967 to 1969.

The factors selected as independent variables fall into three groups:

1. Reasonable charges screen, or method of reimbursement factors
2. The previous year's price, the acceptance of assignments, and other statistics related to Medicare fees
3. Socioeconomic factors.

The method of reimbursement variables have already been described and discussed.

Among the second group, while average actual and allowed physicians' charges have been discussed, the others require more definition.

ASR, the net assignment rate, is "the number of assigned claims submitted with a Form SSA-1490, expressed as a proportion of all claims submitted with Form SSA-1490. The net rate excludes claims from hospital-based physicians who do not bill directly and claims from some prepaid group practice plans. In other words, claims submitted on Forms SSA-1554 or 1556, and considered 'assigned' by definition, are omitted from the computation."^{1/}

S.D. is the standard deviation of average actual physicians' charges.

The selected socioeconomic variables and their definitions are

West: The West Census Region

^{1/} The definition is given in U.S. Department of Health, Education, and Welfare, Social Security Administration, Office of Research and Statistics, Health Insurance Statistics, June 24, 1970, p. 3.

- Phys: The number of non-Federal general practice physicians per 100,000 of population, in 1968
- PMSI: The proportion of the population under 65 with surgical insurance, in 1968
- Age: Those 75 and over as a percentage of those 65 and over in 1970; an indicator of the age structure of the aged
- NBI: The Not-Bought-In proportion, defined as 1 minus those bought in for Medicare Part B by the state as a percentage of those enrolled in Medicare Part A in the state, in 1968

The results as to which factors influenced Medicare physicians' fee increases in 1967-69, and how, are derived from OLS multiple regression with a sample of 35 carrier-states; i.e., for all observations the carrier's jurisdiction was identical with the boundaries of a state. Why not employ all available carriers as observations? The answer is that when a carrier is more than or less than a state or overlaps with another state, much socioeconomic data that are otherwise readily available on a state basis are not available in these cases or are available only at the expense of extensive adjustments. (An example is the five carriers of New York.) On the other hand, it is a disadvantage not to be able to use them; a biased sample may be the result. This sample is employed as well in the assignment, SMI reimbursement, reduction in physicians' charges regressions. It is given in appendix B.

In the equations we are about to examine, the full set of method-of-reimbursement or reasonable-charge-screen variables is never employed. The reason is that the full set comprises 11 variables; and these 11 method-of-reimbursement variables, together with other Medicare-related and socioeconomic variables, quickly begin to exhaust the degrees of freedom -- testing and estimating become impossible. However, two features or aspects of the reasonable charge screen are combined in nearly all of the equations, and this is always done to test specific hypotheses as to the interaction of two features; e.g., the interaction of updating frequency (of customary charges) and the definition of prevailing charges.

Because of multicollinearity problems among the independent variables, a number of variables were consistently not significant statistically and are never shown as behavior influencing Medicare fees.

Table 4 presents the important regressions and results.

Methodological Note: The
Linear Price-Adjustment
Model (Koyck Formula-
tion^{1/})

An increase in price is some fraction of the gap between the equilibrium or desired price and the price realized in the previous year, i.e.:

$$(P_t - P_{t-1}) = \lambda (P_t^* - P_{t-1}) \quad (1)$$

where

$$P_t^* = \beta_0 + \beta_1 (X_t) \quad (2)$$

X_t is a shorthand expression for factors like the method of reimbursement variables, socioeconomic variables, the acceptance of assignments, etc.

$$0 \leq \lambda \leq 1$$

Equation 1 can be rewritten as

$$P_t = \lambda \beta_0 + \lambda \beta_1 X_t - \lambda P_{t-1} \quad (3)$$

Equation 3 states that the current price is a linear function of the current X and the previous year's price:

$$\partial P_t / \partial X_t = \lambda \beta_1 \quad (4)$$

$$\partial (P_t / P_{t-1}) / \partial X_t = \lambda \beta_1 / P_{t-1} \quad (5)$$

$$\partial P_t / \partial P_{t-1} = 1 - \lambda \quad (6)$$

This model implies all of the following:

1. All carriers reach their equilibrium price in the same amount of time, $1/\lambda$. This is so because the price-adjustment factor, λ , is a constant. As a corollary, differences among Part B carriers in socioeconomic context or with

^{1/} L.M. Koyck, Distributed Lags and Investment Analysis, North-Holland Publishing Company, Amsterdam, 1954.

Table 4. Factors Influencing the Rate of Change of Medicare Physicians' Fees, 1967-69:
Non-Linear Adjustment Model with Interactions Between Fees and Allowed Charges and
the Assignment Rate

Factors	Equation							
	1	2	3	4	5	6	7	8
Constant.....	25.557	37.736	28.080	38.164	33.681	25.381	32.330	19.134
Fee schedule:								
Ceiling.....	-4.682 (2.532)	-5.472 (2.845)	-4.734 (2.602)					
R.V.S.....	-4.154 (1.993)	-2.821 (2.112)	-2.071 (2.003)					
Updating frequency:								
6-12 months.....				4.326 (2.883)				
Less than 6 months.....	6.742 (2.465)			7.364 (3.294)	6.326 (2.357)	4.059 (2.578)		
Irregularly.....				2.799 (2.932)				
Specialty recognized.....		-1.378 (1.918)						
Definition of prevailing: Fee schedule.....					-3.135 (1.663)			
Basis of prevailing: Medicare only.....							3.243 (2.169) 5.190 (2.897)	
"Own Business" only.....								-4.188 (2.041)
Blue Shield carrier.....						-2.976 (1.913)		
S.D. of P69.....	1.522 (.238)	1.335 (.252)	-3.455 (1.896) 1.233 (.241)	1.285 (.255)	1.458 (.237)	1.280 (.249)	1.199 (.244)	1.010 (.251)
P67 x (1-ASR68).....	-7.895 (1.102)	-7.761 (1.207)	-7.161 (1.179)	-7.840 (1.201)	-7.724 (1.104)	-6.969 (1.164)	-7.908 (1.203)	-5.296 (1.044)
AP67 x ASR68.....	-8.306 (1.169)	-8.401 (1.283)	-7.723 (1.240)	-7.651 (1.179)	-7.942 (1.151)	-7.193 (1.186)	-7.407 (1.209)	-5.418 (1.014)

continued--

Table 4. continued--

Factors	Equation							
	1	2	3	4	5	6	7	8
West.....	7.052 (1.762)	8.983 (2.089)	8.500 (1.973)	8.182 (2.051)	7.220 (1.760)	8.146 (1.965)	9.724 (2.149)	9.083 (2.133)
Phys.....	.213 (.061)	.204 (.069)	.177 (.064)	.202 (.070)	.175 (.058)	.146 (.060)	.166 (.064)	
PMSI.....		.160 (.098)	.207 (.094)	.114 (.102)		.156 (.100)	.188 (.097)	.263 (.100)
Age.....	-.536 (.373)	-.903 (.398)	-.696 (.385)	-.976 (.433)	-.629 (.373)	-.588 (.392)	-.928 (.401)	-.541 (.415)
NBI.....	.145 (.110)	.128 (.123)	.118 (.116)	.104 (.117)	.119 (.111)	.086 (.115)	.157 (.121)	.140 (.125)
Multiple correlation R....	.9150	.9031	.9139	.9104	.9091	.9105	.9022	.880

Note: Entries in parentheses denote standard errors.

A number following a letter symbol (i.e., P69) refers to a year.

respect to the method of determining reasonable charges do not affect the rate of price adjustment.

2. The effects of method of reimbursement and socioeconomic variables on P_t are a constant (equation 4); and their effects on the rate of price change decrease as price increases. In other words, the two types of variables have less and less of an impact on the growth rate as price increases (equation 5).

3. The adjustment locus is linear. Other things being the same (i.e., holding the values of all methods of reimbursement and socioeconomic variables constant), a dollar's increase in P_{t-1} always generates $(1-\lambda)$ dollars increase in P_t (equation 6).

Our feeling is that these implications of the Koyck formulation are too unrealistic for it to be applied to a study of Medicare physicians' fee behavior.

Results With Respect to Method of Reim- bursement

Applying a fee schedule, whether of the ceiling or the relative-value scale (RVS) type, in place of the CPR screen had a powerful retarding effect on the growth rate of fees. Compare equations 1-3 in table 4. The ceiling variety is more of a brake than the RVS; other things being the same, the former reduces growth over 1967-69 by somewhere between 4.7 and 5.5 percent, and the latter by 2.1 to 4.2 percent. The coefficients of fee schedule ceiling are statistically significant very near or at the 95 percent confidence level. The coefficients of fee schedule RVS, while most meaningful, do not display the very high statistical significance.

In the absence of fee schedules, physicians will charge what they feel is a fair price, basing it on the services rendered and probably taking into account the patient's financial ability. Fee schedules, especially the RVS type, offer an external norm to guide a physician in placing a price on his services; most fee schedules are negotiated between organizations of physicians and insurers or organizations of consumers.

Carriers that employed fee schedules but updated customary charges frequently (less than 6 months) more than

nullified their braking effect (equation 1). Carriers that recognized specialty augmented the braking effect of fee schedules (equation 2). (However, this variable is never statistically significant. Perhaps it is necessary to know what fraction of all physicians' charges were from specialists if the role of this variable is to be brought out unambiguously.)

Where Blue Shield is the carrier, this slowing effect is reinforced (equation 3). Equations 3, 6, and 8 tell us that Medicare physicians' fees grow by 3.0 to 4.2 percent more slowly if the carrier is a Blue Shield. There might be the following reasons: (1) Blue Shields, being nonprofit physicians' associations, get more cooperation from physicians; (2) defining prevailing charges by the 95th percentile (as in our example) in their own business, they were in a better position to apply the tougher 75th percentile definition of prevailing charges to Medicare fees.

Equations 4, 5, and 6 introduce the frequency of updating variables. More and more frequent updating of customary charges leads to faster and faster growth of Medicare physicians' charges. Consider equation 4, where all three possible variables are used (in equations 1, 5, and 6 they are collapsed into one variable, updating less frequently than 6 months): The coefficient of "6-12 months" indicates that growth is 4.3 percent greater than in the case of "above 1 year"; the coefficient of "every few months" indicates that growth is 7.4 percent greater than "above 1 year"; this impact, in turn, is more sizable than "every 6-12 months." The first coefficient is meaningful although not highly significant; the second coefficient is consistently highly significant.

Equation 5 suggests that very frequent updating is in some measure offset by defining prevailing charges with a fee schedule. Equation 6 suggests that very frequent updating is partly offset by the carrier being a Blue Shield. In connection with equation 5, using the 80th-95th percentile of charges (or other bases) to define prevailing, being more generous than using a fee schedule, not surprisingly produces a faster rate of growth.

Equation 7, which introduces the sources of data for prevailing charges feature of reasonable charge screening, discloses that the Medicare-prescribed sources of both

Medicare and "own" business are best for controlling Medicare fees. Employing "own" business only is worst, as it ups the rate of growth by 5.2 percent; this may reflect the fact that there is less of an attempt to control "own" business charges encouraging fee escalation by physicians. Where prevailing came to be based only on Medicare charges, the outcome was worse than where it came to be based on both Medicare and non-Medicare business.

Results With Respect to
Previous Year's Price,
Acceptance of Assign-
ments, and Other Medi-
care Physicians' Fee
Variables

S.D. of P69. The greater the dispersion of the price distribution, the greater the opportunity and incentive for physicians charging lower fees to catch up to physicians charging higher fees. This would cause prices to rise faster where the dispersion was greater. The coefficients of S.D. of P69 are consistently highly significant and range between 1.0 and 1.5 percent. CPR screening does not penalize for "overcharging." In the context of Medicare, overcharging is a false concept. The customary charge criterion and the update of customary charges are at once a compromise with and an incentive to overcharging. These tendencies are aggravated when carriers substitute the 80th or some higher percentile for Medicare's 75th.

P67(1-ASR68) + AP67(ASR68). An implication of the price-adjustment model we are testing is that price increases are an attempt to adjust actually realized prices to an equilibrium or desired price. Given that, one must expect that the previous year's price, or P67(1-ASR68) + AP67(ASR68), will have a coefficient with a negative sign, controlling method of reimbursement and socioeconomic context. Other things being the same, the carrier with the higher previous year's price will experience the lower growth rate of Medicare fees.

The previous year's price was broken up into its two components, P67(1-ASR68) and AP67(ASR68), and each was entered as a separate variable. The coefficients of the two are negative in sign, always highly significant, stable, and practically identical. This evidence tends to confirm the hypothesis incorporated in our price-adjustment model.

Although P67(1-ASR68) and AP67(ASR68) range between -5.4 and -8.4 percent, respectively, both are frequently near -8 percent. This means that, holding all other factors constant, of two carriers that in 1967 differed by \$1 in the average fee realized by physicians for Medicare services, the one with the higher average experienced a growth rate smaller by nearly 8 percent in the average from 1967 to 1969.

The Results with Respect to Socioeconomic Vari- ables

West. The regressions show that, other things being the same, the rate of change of Medicare physicians' fees is consistently higher in the West census region than in other regions. (See appendix B for the states that make up this group. It is important to keep in mind that California, a two-carrier state, is not among them.) The growth ranges from 7.1 to 9.7 percent more in the West region; the coefficients are highly significant.

We can only speculate as to the reasons. In a later section we present evidence that prepaid group practice plans (like Group Health Association, Washington, D.C.; and Kaiser Foundation Plan, Portland, Oregon) had a very rapid growth in premium and average cost per physician's visit in recent years. The population of the West may be denser in prepaid group practice, or HMO, enrollment. The higher rate of growth of Medicare physicians' fees in the West may result from the fact that in the West, Medicare Part B enrollees are more likely to be HMO enrollees as well, and this was possibly aggravated by a very rapid growth in HMO enrollment in recent years. Also, this variable could reflect something about the attitude of physicians in the region toward Medicare.

Phys. Here, clearly, an increase in the relative supply of physicians is associated with a faster rate of growth in Medicare fees. The magnitudes are slight, ranging from 0.15 to 0.21 percent, but they are consistent and statistically significantly different from zero. The reasons might be that supply creates its own demand; physicians reduce their working hours; physician density correlates with better information about markets and what they will bear.

PMSI. This variable combines two factors: (1) as a correlate of previous insurance purchases of current Medicare Part B enrollees, it may reflect the "habit-forming" nature

of previous insurance purchases (i.e., having previously purchased insurance, enrollees will continue it); and (2) competition between the two age groups, those under 65 and those 65 and over, for medical care. The expected positive sign of the coefficient was obtained. The variable is statistically significant in many equations.

Age. The 75 and over population might be expected to utilize physicians' services more. The demand-pull of an age structure of the aged skewed toward the 75 and over group might be expected to bring about a faster rate of growth in Medicare physicians' fees. This did not happen; instead, growth rates were consistently lower where the proportions of population 75 and over were higher. A possible explanation is that physicians tend to discriminate in pricing in the favor of the older aged. If a Part B enrollee 75 and over is more likely to have his medical bills covered by some form of welfare than one under 75, physicians must accept fee schedules as full payment.

NBI and other factors. NBI (percent not bought in by Medicare), income, sex, city, and similar variables also were tested. Usually, they were due to multicollinearity. A variable like NBI was retained, however, to improve the precision of other variables.

Test of the Marginal
Effect From the In-
clusion of the Method
of Reimbursement and
other Medicare-
Related Factors

What is the total contribution of Medicare as a method of reimbursement in explaining the observed variation in Medicare physicians' fee behavior? Is this contribution significant?

The test can be illustrated with the aid of equation 1, table 5. Here, the multiple correlation coefficient is 0.658; it is a measure of the explanatory power of socioeconomic variables with respect to Medicare fee behavior variation. This set is identical with the one employed in most of the regressions of table 4, except for income (state income per capita). The addition of the method-of-reimbursement variables and other Medicare-related factors of equation

Table 5. The Influence of Socioeconomic Factors on the Rate of Change of Medicare Physicians' Fees, the Assignment Rate, SMI Reimbursement per Enrollee, Percent Reduction of Physicians' Fees, and the Increase in Medicare Physicians' Fees

Independent variables and R	Dependent variables								
	The rate of change of Medi-care physicians' fee, 1967-69 (eq. 1)	(eq. 2)	Assignment rate 1969 (eq. 3)	SMI "Money" reim-bursement per enrollee, 1969 (eq. 4)	(eq. 5)	SMI "Real" reim-bursement per enrollee, 1969 (eq. 6)	(eq. 7)	Percent reduction of phys. fees, 1969 (eq. 8)	The in crease Medical phys. 1967-69 (eq. 9)
Constant.....	19.604	18.592	104.683	155.461	156.683	14.358	14.773	-2.475	3.054
West.....	9.100 (3.245)	9.003 (3.184)		12.625 (5.496)	16.759 (5.197)	.148 (1.244)	1.301 (1.249)	.317 (.754)	.956 (.284)
City.....			-.250 (.128)						
White.....			.018 (.126)	.144 (.203)		-.051 (.046)		-.020 (.024)	
Phys.....	-.097 (.090)	-.117 (0.067)	.236 (.095)						-.005 (.008)
Phys-Spe.....				.855 (.392)	1.283 (.305)	-.022 (.089)	.049 (.073)	-0.030 (0.054)	
PMSI.....	.223 (.157)	.209 (.149)	.251 (.150)	-.374 (.267)		-.132 (.061)		.037 (.036)	.020 (.014)
Age.....	-1.021 (.489)	-1.012 (.481)	-.078 (.605)	-2.648 (.984)	-2.232 (.852)	-.083 (.223)	-.235 (.205)		-.146 (.043)
NBI.....	.347 (.172)	.340 (.168)	-.460 (.171)	-.260 (.291)	-.254 (.290)	.059 (.066)	.045 (.070)		.026 (.015)
Income.....	-.00134 (.00390)		-.01103 (.00399)	.01306 (.00628)		.00298 (.00142)		.00186 (.00087)	.0002 (.0003)
Multiple cor-relation coefficient, R.....	.6577	.6559	.7183	.7939	.7472	.5899	.3500	.5235	.7416

Note: Entries in parentheses denote standard errors.

1, table 4, raises the coefficient to 0.915. Is the difference between 0.915 and 0.658 a statistically significant difference? If it is, we must conclude that Medicare as method of reimbursement was a genuine, independent factor influencing Medicare physicians' increases over 1967-69.

The additional effect of Medicare is tested by the F ratio.

H_n : Medicare factors do not contribute

H_a : Medicare factors contribute

The F-ratio is defined:

$$F(N_1, N_2) = \frac{[SRS(N) - SRS(A)] / N_1}{SRS(A) / N_2}$$

Where:

SRS(N): Percent of the variation in the rate of change of Medicare physicians' fees, 1967-69, explained by the independent variables under H_n

SRS(A): Similarly, under H_a

N_1, N_2 : The appropriate degrees of freedom

$F(4, 24) = 14.91$ in this case. This is highly significant. We must reject the hypothesis H_n , that Medicare factors do not contribute to the change in physicians' fees.

All other F tests showed the same result.

Policy Implications and Conclusions

From table 4, the methods of reimbursement which are the "best" (yielding the lowest rate of growth) and "worst" (yielding the highest rate of growth) are:

<u>Characteristic</u>	<u>"Best"</u>	<u>"Worst"</u>
Fee schedule	Ceiling	No fee schedule
Updating frequency	Less frequently than every 12 months	More frequently than every 6 months

<u>Characteristic</u>	<u>"Best"</u>	<u>"Worst"</u>
Specialty	Recognized	Not recognized
Definition of prevailing	Fee schedule	Other than fee schedule
Basis of prevailing	Medicare and "own business"	"Own business only"

It will be recalled that CPR, the Medicare-prescribed reasonable charge screen, or the Medicare method of reimbursement, could be defined (with the qualifications mentioned) in terms of these five categories:

<u>Characteristic</u>	<u>Medicare Method of Reimbursement</u>
Fee schedule	No fee schedule
Updating frequency	Every 6 to 12 months
Specialty	Recognized
Definition of prevailing	Other than 80-95 percentiles of charges or fee schedule
Basis of prevailing	Medicare and "own business"

Medicare, it would seem with respect to two features is like the "worst" method: it does not employ fee schedules, whether ceiling or RVS; its employment of the 75th percentile of charges for definition of prevailing would be subsumed under "other than fee schedule." But it is like the "best" method in the three other respects. (Medicare's being characterized, under updating frequency, by the "every 6-12 months" class may be largely semantic; and the class "less frequently than every 12 months" may be more representative of the practice Medicare intended to prescribe.)

We previously concluded that Medicare qua method of reimbursement, or method of determining reasonable charges, contributed from 1 3/4 to 2 percent to the annual rate of growth of the BLS physicians' fee index. Now, from the section entitled "Factors Influencing Increases," we see that in 1966-69, CPR, or the specifically prescribed Medicare method of determining reasonable charges, either was not practiced by the carriers or competed with several other methods. We see too that as reasonable charge screening goes, CPR screening would be among the more effective for controlling physicians' fee behavior. So Medicare may have opened the way to complications and deviations when it prescribed reasonable charge

screening. However, it is perhaps more precise to conclude that it was not so much the attempt to practice CPR as the wide divergences from CPR that cost the additional 1 3/4 to 2 percent per annum.

It is sometimes said that "...payment at levels below the going price must either reimpose part of the burden of medical care on the beneficiary...or restrict the beneficiary to physicians willing to accept less than is usually charged for services...."^{1/} But this is a misconception of the problem of controlling fees and costs. Reasonable charge screening, even an ideal version, could produce the escalation it is trying to prevent, by validating or even initiating increases in the levels of fees. When charges in excess of current customary, prevailing, and reasonable, though disallowed as a basis of reimbursement, enter into the subsequent CPR determination after an updating interval, market forces are given free play (with an imposed lag) and there is in addition an inducement to charge fees currently above those allowed. It is by no means evident that availability or quality of medical care would be restricted by methods of reimbursement without these features if these methods attempted to control fees on a broad front.

As opposed to the marked effect of fee schedules in dampening rates of fee increase, the wide variability of fees (S.D. of P69 in table 4) shows the "demonstration effect" of the higher fees in stimulating rates of increase in the average. Nor can we expect that costs will be held down by increasing the supply of physicians, at least within limits now foreseeable. The density of physician supply in the recent past has been associated with somewhat faster, rather than slower, rates of average price increase, perhaps because of more highly structured markets. Indeed, in a predominantly insured population, a marginally larger supply of physicians may activate an increased demand.

Are Medicare Fees Converging?

It was hypothesized that the extension of medical insurance to a large and generally below-average income population would improve the demand for lower-priced services and

^{1/} Bureau of Health Insurance, Medical Insurance Payments Under Conditions of Rising Fees, p. 1.

that prices in this segment of the "market" would rise faster than prices in higher priced segments. The analysis refutes the hypothesis: there is no evidence of convergence; on the contrary, prices may have diverged, at least between 1967 and 1969.

Analyses based on the Medicare "reasonable charges" series (physicians' bills of a 5 percent sample of beneficiaries) revealed that, while the average (mean) prices rose from 1967 to 1968 to 1969, the standard deviations, already very large in 1967, rose much faster, indicating a wider dispersion for both medical and surgical procedures (table 6). The coefficients of variation (standard deviation divided by the mean) are as follows:

	<u>1967</u>	<u>1968</u>	<u>1969</u>
Medical.....	1.44	2.27	2.22
Surgical.....	1.34	1.47	1.52

The analyses of variability among 35 carriers point to the same conclusion (table 7). The means of the coefficients of variation for the individual carriers, for both medical and surgical procedures, rose from 1967 to 1969. The coefficient of variation for medical services was larger, and nearly doubled from 1967 to 1969, indicating a substantial widening of the distribution.

Similarly, data of the California Medical Association on physicians' fees generally indicate that the standard deviations of the means, and the coefficients of variation for both San Francisco and Los Angeles, which hardly changed or which declined from 1962 to 1967, widened markedly between 1967 and 1971. These were, of course, the years of severe inflation, and the increased variability cannot be attributed directly to Medicare, but certainly there is no evidence of convergence.

Medicare Physicians' Fees and
"What Others Pay"

Medicare and the BLS
Physicians' Fee Index

The standard measure of change in physicians' fees nationally is the physicians' fee index of the Bureau of Labor

Table 6. Mean, Standard Deviation, and Coefficient of Variation of Medicare Physicians' Charges for Selected Types of Service in 1967, 1968, and 1969

(In U.S. dollars)

Statistics characterizing Medicare physicians' charges	1967	1968	1969
<u>Mean</u>			
All services.....	11.11	12.02	12.92
Medical care.....	7.10	8.06	8.71
Surgery.....	122.77	119.15	121.47
<u>Standard deviation</u>			
All services.....	35.76	39.45	41.95
Medical care.....	10.21	18.28	19.30
Surgery.....	169.00	174.79	182.18
<u>Coefficient of variation^{a/}</u>			
All services.....	3.22	3.28	3.25
Medical care.....	1.44	2.27	2.22
Surgery.....	1.38	1.47	1.50

a/ Standard deviation divided by mean.

Source: Reasonable Charges Tabulations from 5 percent sample of medical insurance bills, Social Security Administration, Office of Research and Statistics, tables IA and IY, as of December 1971.

Table 7. Mean and Standard Deviation of Medicare Part B Carriers' Coefficients of Variation of Physicians' Charges for Selected Types of Service, 1967-69

Statistics characterizing physicians' charges	1967	1968	1969
<u>Weighted mean of coefficients of variation</u>			
All services.....	3.16	3.26	3.29
Medical care.....	1.42	2.37	2.57
Surgery.....	1.31	1.38	1.45
<u>Weighted standard deviation of coefficients of variation</u>			
All services.....	0.17	0.17	0.18
Medical care.....	0.28	0.23	0.17
Surgery.....	0.09	0.12	0.12

Note: The sample size is uniformly 35.

Both the mean and the standard deviation are weighted.

X_{it} = Mean physician charge of the i-th carrier at time t

$(S.D.)_{it}$ = Standard deviation of physician charges of the i-th carrier at time t

$(C.V.)_{it}$ = Coefficient of variation of physician charges of the i-th carrier at time t

where

$$(C.V.)_{it} = \frac{(S.D.)_{it}}{(\bar{X})_{it}}$$

N_{it} = Number of all services of the i-th carrier, at time t

$(\bar{C.V.})_t$ = Weighted mean of $(C.V.)_{it}$

where

$$(\bar{C.V.})_t = \frac{\sum_i N_{it} (C.V.)_{it}}{\sum_i N_{it}}$$

continued--

Table 7. continued--

$(S.D.C.V.)_t$ = Weighted standard deviation of $(C.V.)_{it}$

where

$$(S.D.C.V.)_t = \left\{ \frac{\sum_i N_{it} \cdot \left\{ (C.V.)_{it} - (\overline{C.V.})_t \right\}^2}{\sum_i N_{it}} \right\}^{1/2}$$

Source: The source of X_{it} , $(S.D.)_{it}$, and N_{it} for the three types of service are Reasonable Charges Tabulations from 5 percent sample of medical insurance bills, Social Security Administration, Office of Research and Statistics, Tables 2A, 2X, and 2A, respectively, as of December 1971.

Statistics, a component of the Consumer Price Index. It is a Laspeyres index, weighted by base period value, with current prices based on "customary" charges for specified medical and surgical procedures as quoted by a sample of physicians. Medicare "reasonable charge" data, on the other hand, are based on actual (billed) and allowed (reimbursable) charges from the bills of a 5 percent sample of enrollees. Though it is limited to Medicare patients and the services they use, it represents prices actually charged, not quoted.

In the years 1967-70, a Laspeyres index of Medicare "actual" (i.e., billed) prices closely paralleled the BLS index, rising somewhat faster in 1968 and more slowly in 1969 and 1970 (table 8). The total increase for the 3 years was nearly the same for both indexes. The Medicare index of charges allowed as a basis of reimbursement rose only about two-thirds as fast and was noticeably restrained after 1968.

There was great variation in the rates of change in physicians' fees for different services (table 9). Average bills for medical care (about three-fourths of all services), consultations, and anesthesia rose more than 30 percent in 3 years, and average allowed charges more than 20 percent. Average bills for surgery and diagnostic procedures, on the other hand, rose less than 10 percent, and average allowed charges for these services rose scarcely at all.

Medicare and Blue Shield: The Common Procedures

Many Medicare SMI carriers are Blue Shield Plans, which serve Medicare enrollees side by side with their non-Medicare subscribers. Blue Shield Plans offer insurance coverage for ambulatory care which in many ways resembles Medicare, including a test of "usual, customary, and reasonable" prices as a basis of reimbursement. In spite of the difference in nomenclature, "usual and customary" is very nearly the equivalent of Medicare "customary and prevailing," and often the same screening procedure is used. The precise definitions, however, may differ; for example, a plan may use the 75th percentile of the distribution in the community as the upper limit of an allowed charge for Medicare while permitting reimbursement up to the 90th percentile for Blue Shield subscribers. Neither actual nor allowed charges need be identical in the same Blue Shield Plan.

Table 8. Comparison of BLS Physicians' Fee Index and Medicare Physicians' Fee Index, 1968-70
(Index: 1967=100)

	Actual charges			Allowed charges		
	1968	1969	1970	1968	1969	1970
BLS physicians' fee index.	105.60	112.90	121.40			
Annual rate of change....	5.60	6.91	7.53			
Medicare physicians' fee index: ^a						
Laspeyres price index....	107.00	113.40	120.60	105.70	109.90	114.30
Annual rate of change....	7.00	5.98	6.35	5.70	3.97	4.00
Simple price index, base-year quantity weighted..	110.99	119.01	126.48	109.60	115.18	117.32
Annual rate of change....	10.99	7.23	6.28	9.60	5.09	1.86
Mean charge index.....	108.19	116.29	128.35	106.87	112.81	121.73
Annual rate of change....	8.19	7.49	10.37	6.87	5.56	7.91

a/ The Laspeyres formula, or simple price index base-year value-weighted, is

$$\frac{\sum_i \left(\frac{P_{it}}{P_{i0}} \right) \cdot \left(\frac{P_{i0} \cdot Q_{i0}}{\sum_i P_{i0} \cdot Q_{i0}} \right)}{\sum_i \left(\frac{P_{i0}}{P_{i0}} \right) \cdot \left(\frac{P_{i0} \cdot Q_{i0}}{\sum_i P_{i0} \cdot Q_{i0}} \right)}$$

The simple price index, base-year quantity weighted, is

$$\frac{\sum_i \left(\frac{P_{it}}{P_{i0}} \right) \left(\frac{Q_{i0}}{\sum_j Q_{j0}} \right)}{\sum_i \left(\frac{P_{i0}}{P_{i0}} \right) \left(\frac{Q_{i0}}{\sum_j Q_{j0}} \right)}$$

The mean charge index is $\frac{(\sum_i (PQ)_{it} / \sum_i Q_{it})}{(\sum_i (PQ)_{i0} / \sum_i Q_{i0})}$

continued--

Table 8. continued--

Where

P_i is the physicians' fee for the i -th service. P_i can represent either the actual or mean physician charge or the mean allowed charge.

Q_i is the number of the i -th service.

t is time period t .

0 is the base time period.

Source: Medicare Physicians' Fee Indexes derived from Reasonable Charges Tabulations from 5 percent sample of medical insurance bills, Social Security Administration, Office of Research and Statistics, table 1A, as of December 1971.

Table 9. Medicare Mean Charge Indexes by Type of Service, 1968-70
(Index: 1967=100)

Type of service	Actual charges			Allowed charges		
	1968	1969	1970	1968	1969	1970
Medical care.....	113.50	122.70	131.10	112.10	118.60	123.80
Surgery.....	97.10	98.90	105.00	95.70	95.70	99.60
Consultation.....	116.80	134.00	140.10	114.90	128.10	133.80
Diagnostic:						
X-Ray.....	100.70	103.80	107.50	99.60	101.10	102.60
Laboratory.....	101.60	104.60	108.20	100.20	102.10	104.10
Radiation therapy.....	105.60	110.10	113.10	104.30	108.20	110.00
Anesthesia.....	109.20	120.60	133.11	107.10	117.00	123.30
Assistance at surgery.....	107.00	114.30	125.50	104.90	110.80	118.70
Other medical services.....	114.60	121.60	127.00	113.00	118.60	122.20

Source: Derived from Reasonable Charges Tabulations from 5 percent sample of medical insurance bills, Social Security Administration, Office of Research and Statistics, Table 1A, as of December 1971.

Medicare physicians' fees have tended to rise more slowly where carriers were Blue Shield Plans, and apparently more slowly for Blue Shield Medicare than for other Blue Shield subscribers (table 10). At any rate, this is the reading of a limited comparison in two Blue Shield Plans, Maryland and Michigan, which were able and willing to provide parallel data on Medicare and non-Medicare prices for a list of common procedures from 1969 to 1971. These data relate to a period after the 1968 SSA freeze, but data on Blue Shield "UCR" plans before 1969 are hard to come by, since most of these were not introduced until 1968 or later.

Indexes constructed for 24 procedures common to Medicare and Blue Shield in Maryland indicate that, between 1969 and 1971, both actual and allowed prices rose more slowly for Medicare patients than for Blue Shield subscribers. The differences were substantial, especially for allowed charges, which rose nearly 10 percent for Blue Shield but less than 3 percent for Medicare.

The Michigan data, covering 19 procedures quarterly, show somewhat more rapid increases than in Maryland for actual charges, and not much difference between Blue Shield and Medicare. Medicare allowed charges increase less than half as much as Medicare actual charges, while Blue Shield allowed charges lag slightly behind Blue Shield actual. The Michigan data, however, shed some light on the ways the method of reimbursement may affect prices. In contrast to the rather smooth rise of actual charges, allowed charges exhibit abrupt quarterly changes, including both sharp increases and sharp declines, which may represent the effects of administrative determinations. The impression is that the Michigan screening has a pronounced affect on allowed charges.

Physicians' Fees Under Alternative Methods of Reimbursement

The customary/prevailing standard for determining allowable charges is an adaptation of conventional fee-for-service pricing of physicians' services. Though this is by far the dominant mode of pricing, other modes are in use in a variety of arrangements for delivering and pricing physicians' services.

Some insurance plans use "relative value scales" in which prices for all services are expressed as multiples of

Table 10. Comparison of Physicians' Fee Indexes for
Selected Common Procedures under Two Screens:
Blue Shield's "UCR" and Medicare's "CPR"

Carrier	Indexes ^a / of actual charges		Indexes ^a / of allowed charges	
	Medicare	Blue Shield	Medicare	Blue Shield
Maryland Blue Shield:				
1969.....	100.00	100.00	100.00	100.00
1970.....	104.90	104.90	100.80	106.20
1971.....	106.80	110.40	102.60	109.60
Number of pro- cedures.....	24	24	24	24
Michigan Blue Shield:				
1969:				
1st quarter...	100.00	100.00	100.00	100.00
2nd quarter...	102.30	102.70	104.40	105.40
3rd quarter...	102.40	104.30	104.40	108.10
4th quarter...	103.40	106.50	104.80	109.50
1970:				
1st quarter...	105.10	108.10	104.50	108.30
2nd quarter...	106.20	109.60	100.60	102.30
3rd quarter...	108.20	109.00	101.00	99.10
4th quarter...	107.40	109.00	99.80	98.60
1971:				
1st quarter...	110.20	110.40	102.40	108.70
2nd quarter...	112.00	111.80	106.10	110.10
3rd quarter...	112.60	113.90	105.60	111.80
4th quarter...	113.80	115.20	107.30	112.20
1972:				
1st quarter...	114.00	115.30	106.50	112.50
Number of pro- cedures.....	19	19	19	19

Note: Common procedures refer to procedures of approximately equal importance to persons over and under 65, and of nearly equivalent performance difficulty. The lists of common procedures of Maryland and Michigan are given in appendix B. The selection methodology employed by NABSP is also to be found there.
UCR means usual, customary, reasonable; CPR means

Table 10. continued --

customary, prevailing, reasonable. These terms, which are described in detail elsewhere, are the Blue Shield and Medicare bases, respectively, for determining allowed physicians' charges. Data for comparisons were available only for Maryland and Michigan Blue Shield.

a/ The Laspeyres formula was employed.

Source: Research Department of the National Blue Shield Plans (NABSP).

the price of some basic service, reflecting differences in duration and complexity of services. Price changes are accomplished by changes in the base price, thus retaining relative values unchanged. The San Joaquin County, California, plan is a prepaid plan in which physicians accept the RVS price as full payment. The administration of the plan includes control of prices and review of utilization rates for purposes of medical management. The index of RVS prices of the San Joaquin plan rose by 23.6 percent between 1966 and 1971 (table 11). This was very much less than the increase in the BLS physicians' fee index in the same period, and less than the general index of physicians' fees compiled by the California Medical Association. This is consistent with the analytical finding of the analyses of intercarrier differences in the rate of increase in Medicare charges, which revealed a significant dampening effect on price increases where RVS was the basis of pricing.

Measuring "prices of physicians' services" in HMO's for comparison with fee-for-service prices presents conceptual and definitional difficulties. There is no financial transaction between doctor and patient; only between patient and HMO and between doctor and HMO. The "price" the patient pays is mainly his dues; the doctor is salaried. Perhaps the nearest to a physicians' fee index is an index of per patient or per visit cost of doctors' services to the group.

Using cost per service, we constructed an index for the Group Health Association of Washington, D.C., 1966-71, by weighting cost changes per visit for the whole range of ambulatory services provided (table 11). The resulting index shows an annual rate of increase of more than 8 percent, distinctly higher than the BLS or other observed rates. We take this to be a reflection of the rapidly rising levels of physicians' incomes, which have forced group practices to raise salaries rapidly to compete for qualified staff. Such groups have depended heavily on being able to attract young doctors just entering practice, to whom this employment may be a transition between internship and private practice. The opportunity costs of young, well-trained doctors have been rising rapidly, partly because of higher fees for service, and partly because of improved productivity (technology). Since group practice is already relatively efficient compared to individual practice, the increase in salaries has resulted in an increase in costs. That premiums have not risen to the same extent is due to factors of medical management (table 12).

Table 11. Comparison of Physicians' Fee or Cost per Visit
Indexes Under Alternative Methods of Reimbursement,
1970-71

(Index: 1966=100)

	1970	1971
<u>Group practice</u>		
Group Health Association, Inc. ^{a/} Washington, D.C.....	n.a.	148.20
<u>Individual practice</u>		
California County Medical Societies Foundation for Medi- cal Care of San Joaquin County, California ^{b/}	115.92	123.56
California Physicians' Fee Index..	122.29	128.39
BLS Physicians' Fee Index.....	129.98	138.97

n.a. = not available.

a/ GHA's physicians are salaried.

b/ San Joaquin County's physicians are reimbursed on the basis
of a fee-schedule relative value scale.

Source: GHA -- a Laspeyres cost per unit index calculated from
George S. Perrott and Goldie Krantz, Notes from Special
Studies of Operating Statistics, Group Health Associa-
tion, Inc., Washington, D.C., May 1972.
San Joaquin County -- a Laspeyres physicians' fee index
calculated from data provided by the plan to the
Federal Employees Health Benefits Program.
California -- Socio-economic Report, California Medical
Association.
BLS -- Bureau of Labor Statistics, Handbook of Labor
Statistics, 1971, and BLS, Monthly Labor Review,
October 1972.

Table 12. Comparison of Insurance Premiums
(In percent)

	1964	1970
<u>Kaiser Foundation Health Plan of Portland, Oregon (with hospital)</u>		
Dues per member.....	100	154.06
Dues per family.....	100	156.49
<u>Washington, D.C. - G.H.A.</u>		
Single plan:		
Standard with hospital.....	100	154.64
Standard without hospital.....	100	153.64
Premium with hospital.....	100	154.37
Premium without hopsital.....	100	154.10
Family plan:		
Standard with hospital.....	100	154.96
Standard without hospital.....	100	154.34
Premium with hospital.....	100	154.10
Premium without hospital.....	100	154.37

Source: Kaiser Foundation, 1964 -- Ernest W. Seward, M.D., and others, "Documentation of Twenty Years of Operation and Growth of a Prepaid Group Practice Plan," in Proceedings, Part II, Group Health Association of America, October 1967 (GHA, Washington, D.C.), pp. 113, 115. Kaiser Foundation, 1970 -- Communication with Ernest W. Seward, M.D. GHA -- Communication with GHA.

It was hypothesized that the existence of prepaid practice groups on a scale large enough to be a significant factor in the market for medical services would have a dampening effect on fee-for-service prices. The only opportunity for a test of this hypothesis was in California, where the Kaiser Foundation prepaid group plans have enrolled very large numbers (in the San Francisco area, on the order of 20 percent of the population; in the Los Angeles area, a much smaller fraction). There is no reason, a priori, to expect great differences in levels and rates of change between the two places, and such evidence as we have might suggest that fees might rise rather faster in San Francisco: it has a higher per capita income, higher density of physicians, and more hospital beds in relation to population. In fact, however, the California Medical Association (CMA) data show consistently lower prices, especially for surgical procedures, less variability, and slower price increases in San Francisco (tables 13 and 14). This is not inconsistent with the hypothesis, but neither is it conclusive evidence that large-scale HMO's will affect fee-for-service prices through competition.

Factors Influencing the Acceptance of Assignments

By agreement between the physician and the patient, the physician's fee may be "assigned"; that is, the claim may be submitted by the physician to the carrier for direct reimbursement of 80 percent of the allowable charge, with the remaining 20 percent billed by the physician to the patient. As a condition of assignment, the physician agrees to accept the allowable charge as payment in full, thereby foregoing the option, available to him on nonassigned claims, of charging the patient in excess of the allowable charge. Thus, in return for the certainty of (relatively prompt) payment, the physician agrees to limit his fee to the allowable charge.

As of April 1968, patients were permitted (by law) to claim for reimbursement on the evidence of the doctor's bill, without having to present evidence that it had been paid, as previously required. This obviously made assignment more attractive to the doctor by relieving him not only of the uncertainty but also of the expenses of collection. The assignment rates (assigned bills as a percent of all bills) promptly rose by 4 or 5 percentage points.

For the 35 statewide carriers used in this study, the mean net assignment rate (excluding bills from hospital-based

Table 13. Physicians' Fees Behavior in Relatively High and Relatively Low HMO Enrollment Areas: San Francisco and Los Angeles, 1962, 1967, and 1971

Physicians' fees	Deflated ^{a/}		Not deflated	
	San Francisco	Los Angeles	San Francisco	Los Angeles
Index:				
1962.....	100.00	100.00	100.00	100.00
1967.....	108.71	115.81	120.02	127.04
1967.....	100.00	100.00	100.00	100.00
1971.....	101.21	108.90	121.64	129.09
Mean price (\$):				
1962.....	47.71	51.13	47.71	51.13
1967.....	55.73	54.28	61.53	59.54
1971.....	57.51	68.16	76.30	88.61
Standard deviation (\$):				
1962.....	8.86	11.71	8.86	11.71
1967.....	8.24	11.17	9.10	12.25
1971.....	12.97	15.56	17.21	20.23
Coefficient of variation:				
1962.....	0.22	0.27	0.22	0.27
1967.....	0.21	0.23	0.21	0.23
1971.....	0.27	0.29	0.27	0.29

Note: In symbols, the mean price of time, $t = \sum (PQ)_{jt} / \sum Q_{jt}$
The standard deviation of time, $t = \sum (\sigma Q)_{jt}^2 / \sum Q_{jt}$
The coefficient of variation of time, $j t = \sum (C.V. \cdot Q)_{jt} / \sum Q_{jt}$
where
 P_{ijt} : Price, i , of procedure, j , at time, t
 Q_{ijt} : Frequency of price, i , of procedure, j , at time, t
 Q_{jt} : The total frequency of procedure, j , at time, t
where $Q_{jt} = \sum_i Q_{ijt}$

Table 13. continued--

P_{jt} : The average price of procedure, j , at time, t

where $P_{jt} = \sum_i (PQ)_{ijt} / Q_{jt}$

σ_{jt} : Standard deviation of P_{ijt}

where $\sigma_{jt} = \left\{ \frac{\sum_i (P_{ijt} - P_{jt})^2 Q_{ijt}}{Q_{jt}} \right\}^{1/2}$

$(C.V.)_{jt}$: Coefficient of variation of P_{ijt}

where $(C.V.)_{jt} = \frac{(\sigma)}{(\bar{P})_{jt}}$

Laspeyres index formula with 1962 as the base year was employed throughout.

a/ The deflators employed are the respective consumer price indexes (CPI's) of the two cities:

Year	San Francisco	Los Angeles
1962	100.00	100.00
1967	110.40	109.70
1971	132.68	130.00

From Bureau of Labor Statistics, U.S. Department of Labor, Monthly Labor Review.

Source: California Medical Association, fees index data provided to this study on punch cards.
The data were for June 1962, 1967, and 1971 for 14 individual practice procedures where they were available for all 3 years. The procedures include six surgical, five medical, two pathology, and one radiology. The statistics consisted of levels of charge and frequencies. San Francisco includes the six Bay Area counties plus Santa Clara County; Los Angeles is Los Angeles County.

Table 14. Rate of Change from 1962 to 1971 in the Price of
Selected Procedures^{a/} in Relatively High and Relatively
Low HMO Enrollment Areas: San Francisco and Los
Angeles
(In percent)

	Deflated ^{b/}		Not deflated	
	San Francisco	Los Angeles	San Francisco	Los Angeles
T.&A. - under 18 years.....	14.47	31.35	51.89	70.76
Appendectomy.....	2.24	28.39	35.68	66.91
Hemorrhoidectomy - in- ternal and external.....	5.27	20.32	39.70	56.42
Herniotomy - inguinal, unilateral.....	17.30	29.83	55.66	68.79
Total hysterectomy.....	10.13	28.40	46.14	66.92
O.B. delivery, ante- and postpartum care.....	11.11	29.89	47.14	68.87
Chest - single PA (x-ray, diagnostic).....	-4.83	-1.33	26.23	28.31
Complete blood count.....	-11.36	-6.76	17.66	21.17
Complete routine urin- alysis (chemical and microscopic).....	-2.66	3.02	29.28	33.96
Follow-up office visit, routine.....	10.00	13.57	45.87	47.56
Follow-up home visit, routine.....	32.25	31.41	75.50	77.37
Follow-up hospital visit, routine.....	39.94	49.44	85.93	94.31
Consultation - complete examination.....	6.62	13.71	41.49	47.82
Electrocardiogram with interpretation and report.	-7.16	-0.47	23.21	29.42

continued --

Table 14. continued --

a/ The rate of change in the average price of a procedure between 1962 and 1971, i.e., $P_j 1971 \div P_j 1962$

b/ The deflators are as in table 13.

Source: California Medical Association fees index data.

physicians reimbursed directly in all cases) was 56.2 percent in 1968 and 60.6 percent in 1969 (table 2). (These two statistics are a little lower and exhibit a larger increase than the national rates of about 59 and 61.5 percent in 1968 and 1969, respectively.)

Assignment rates vary considerably from carrier to carrier, from physician to physician, from case to case. In general, bills for more expensive services are more likely to be assigned than bills for less expensive ones. Beyond this, we may hypothesize that the more nearly the allowed charge approximates the physician's going rate for a given service, the more likely it is that the physician will accept assignment and forego the option to charge the patient a higher fee. We might hypothesize, further, that the higher the patient's income, the less likely it is that the physician will forego that option.

The analysis of variability among the 35 statewide carriers in the net assignment rate reveals a tendency for these elements of the method of reimbursement which are associated with slowly rising levels of fees to be associated also with lower net assignment rates (table 15). Such factors as the use of fee schedules, the use of lower percentile cutoffs for the definition of prevailing charges, and less frequent updating of customary charges have been found to yield slower rates of price increase. For this reason they appear to make doctors less likely to accept assignment. The relationships, however, are not conclusive: though the signs and values of the coefficients point to this result, the coefficients are not statistically significant. On the other hand, assignment rates were significantly higher (5.6 percent on the average) among carriers that, other things being the same, recognized medical specialties in determining allowable charges.

The assignment rate was depressed among carriers that used either Medicare experience only or "own business" experience only as the basis for prevailing charges, in comparison with carriers who used a mix of all insured business (equations 2 and 3, table 5). We can only conjecture that the mix yields higher fees (i.e., nearer the going rate) than either component alone. The analysis showed that assignment rates were higher where the level of allowable charges was higher; these coefficients, on the whole, are significant.

In general, however, methods of reimbursement were less important than socioeconomic variables in explaining

Table 15. Factors Influencing the Assignment Rate, 1969

Factor	Equation			
	1	2	3	4
Constant.....	59.210	106.898	79.509	100.508
Specialty recognized.	5.635 (3.081)			
Basis of prevailing: Medicare only.....		-5.885 (2.921)	-4.137 (3.679)	
"Own business" only.		-8.494 (3.940)	-8.296 (4.316)	
Blue Shield carrier..			-3.160 (3.118)	
AP69.....	2.398 (1.225)	1.722 (.870)	1.984 (1.244)	1.188 (.913)
City.....	-.321 (.124)	-.268 (.109)	-.261 (.126)	-.288 (.109)
White.....	-.072 (.128)		-.072 (.133)	
Phys.....	.185 (.098)		-.121 (.109)	.201 (.092)
PMSI.....	.314 (.143)	.221 (.143)	.259 (.149)	.249 (.143)
Age.....	.995 (.771)		.830 (.809)	
NBI.....	-.444 (.161)	-.548 (.163)	-.558 (.169)	-.487 (.163)
Income.....	-.016 (.004)	-.00656 (.00348)	-.011 (.004)	-.012 (.004)
Multiple correlation, R.....	.7820	.7509	.7895	.7370

Note: Entries in parentheses denote standard errors.
A number following a letter symbol (i.e., P69) refers to a year.

carrier-to-carrier variability in the assignment rate. Assignment rates were lower where the proportion of the population 65 and over living in cities of over 100,000 was higher, and lower where per capita incomes were higher. If state per capita income could be a proxy for the incomes of SMI enrollees, it would appear that where patients are more likely to have complementary health insurance or otherwise are better able to pay, assignment rates are lower. Similarly, a low not-bought-in proportion (NBI), which ensures the physician 100 percent collection of the allowable charge and moreover, we believe, makes acceptance of assignment mandatory, is also associated with high assignment rates.

From the variables included in the analyses, it appears that higher assignment rates could be brought about by higher and more rapidly rising prices, but this approach has obvious dangers. It should be noted, however, that these variables altogether account for only about 60 percent of the carrier-to-carrier variability. The remainder is embedded in a variety of institutional/political factors beyond the reach of our analysis -- such as local attitudes of physicians or of physicians' organizations.

Factors Influencing Disallowance of Charges

The screening of doctors' bills to determine the charge to be allowed for purposes of reimbursement results, in an appreciable fraction of cases, in an "allowed" charge that is less than the actual amount of the bill. This reduction is not a reduction in the doctor's bill: except in cases of assignment, the patient is liable to the doctor for the full amount. What is reduced is the basis of reimbursement; the beneficiary cannot claim more than 80 percent of the allowed charge.

Such reductions have become increasingly frequent (table 2). In 1967, the allowed charge was less than the actual charge in 3.5 percent of the cases; by 1969 the figure had risen to 12.6 percent. By 1969 the disallowed portion averaged nearly 5 percent of total physicians' charges. Both figures were conspicuously higher in the North Central Region, and were lower than average in the South.

There is variability among carriers in the average percent reduction of physicians' charges, all services, which

is not surprising considering the differences among carriers in the method and standards of screening (table 16). There is a tendency for the percent reduction to be lower where ceiling fee schedules are in use, since fee schedules are accepted by both physicians and carriers, and higher where customary charges are updated every 6 to 12 months. But, in general, the variables describing differences in the method of reimbursement explained relatively little of the carrier-to-carrier variability in disallowances; and all of the variables together in this analysis explained less than half.

The influence of certain socioeconomic variables seems more pronounced. There was a tendency for disallowances as a percentage of billed charges to be lower where the proportion of whites in the 65 and over population was higher, where a higher proportion was also covered by Medicaid, and where the relative supply of specialists -- the number of non-Federal medical specialty physicians per 100,000 of population -- was smaller.

Disallowances are the result of differences between actual charges, on the one hand, and reasonable charges as defined for purposes of reimbursement by Medicare carriers, on the other. These differences become larger and more frequent if actual charges accelerate their rise from the levels that currently are the basis of CPR determinations; if actual charges are diverging, so that more of them fall above the percentile limit of prevailing charges; or if the basis of determining customary and prevailing charges deliberately introduces longer lags that lower the rate of increase of reasonable charges relative to that of actual charges. During the period covered by this analysis, actual prices were rising rapidly and diverging, and Social Security was introducing procedures to dampen the increases in allowed Medicare charges. The rising incidence (and extent) of disallowances from 1967 to 1969 reflects this.

Factors Influencing Benefits Paid Per Enrollee

SMI benefits per enrollee more than doubled from 1967 to 1968, as the Medicare Part B program became more widely recognized and used, and increased again by more than 15 percent in 1969. The increases were evident and of the same general magnitude in all regions (table 2).

Table 16. Factors Influencing the Percent Reduction of
Physicians' Charges, 1969

Factor	Equation			
	1	2	3	4
Constant.....	-5.278	-10.212	-6.157	-1.419
Fee schedule:				
Ceiling.....	-1.714 (.908)	- 1.059 (.946)		
Updating frequency:				
6-12 months.....	2.067 (.746)		2.098 (.795)	3.162 (.956)
Less than 6 months..	1.324 (.905)		1.417 (.921)	2.600 (1.084)
Irregularly.....				.498 (.885)
Specialty recognized.		1.542 (.687)		
Definition of prevailing: 80-95 percentile....			1.647 (1.167)	
Fee schedule.....			.693 (1.049)	
Blue Shield carrier..				1.890 (.674)
AP69.....		.045 (.266)		
West.....	.478 (.674)			.668 (.646)
White.....	-.066 (.030)	-.026 (.033)	-.048 (.029)	-.054 (.024)
Phys-Spe.....	.111 (.043)	.062 (.058)	.073 (.042)	.087 (.039)
Age.....	.161 (.133)	.186 (.170)	.186 (.149)	
NBI.....	.072 (.037)	.083 (.039)	.049 (.039)	.067 (.035)
Multiple Correlation, R.....	.6457	.5965	.6261	.6927

Table 16 . continued --

Note: Entries in parentheses denote standard errors.
A number following a letter symbol (i.e., AP69) refers
to a year.

The variability among carriers in 1969 was on the order of 25 percent. Monetary benefit per enrollee tended to be greater when customary charges were updated at intervals of 6 to 12 months, where the carrier was a Blue Shield plan, in the West, and where the relative supply of specialists was greater (table 17). Benefits were distinctly less where enrollees 75 years of age and over predominated.

When benefits take into account differences among carriers in the prices of physicians' services, i.e., when benefits are in terms of limits of physician services per enrollee, the same variables are significant but more of the variability is unaccounted for.

As a policy consideration, differences in benefits per enrollee are particularly important as they bear on the distributive effects of the operation of SMI. Though premiums are uniform, benefits vary systematically to the disadvantage of enrollees in lower-income and higher-age groups. In table 17 we see that benefits per enrollee, both in money and in real terms, are significantly lower where people 75 and over are a higher percentage of the aged. These perverse distributive effects could be overcome by variable premiums, variable coinsurance, or Medicaid coverage.

Table 17. Factors Influencing SMI Reimbursement per Enrollee in 1969, "Money" and "Real" Reimbursement

Factor	"Money" ^{a/} (equation 1)	"Real" ^{b/} (equation 2)
Constant.....	168.001	20.654
Updating frequency:		
6-12 months.....	21.681 (7.777)	1.427 (.663)
Less than 6 months.....	9.912 (8.274)	.769 (.700)
Irregularly.....	9.436 (6.904)	.593 (.587)
Blue Shield carrier.....	10.704 (5.529)	.687 (.458)
S.D. of P69.....		.059 (.088)
AP69.....	-.965 (1.988)	-.818 (.394)
West.....	19.711 (5.462)	1.755 (.540)
White.....		.009 (.020)
Phys-Spe.....	1.522 (.437)	.133 (.040)
Age.....	-3.434 (1.085)	-.247 (.111)
NBI.....		-.028 (.024)
Multiple correlation, R...	.8163	.6931

Note: Entries in parentheses denote standard errors.

A number following a letter symbol refers to a year.

^{a/} "Money" = SMI reimbursement per enrollee.

^{b/} "Real" =
$$\frac{\text{"Money"}}{P69(1-ASR69) + AP69 \cdot ASR69}$$

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